

PC PILOT



The Magazine for Flight Simulation in association with www.simflight.com

JUMBO JAPES

We put PS1 and 747-200
through their paces

GET DOWN (LOADING) SHEP!

We guide you through the
obstacles to getting freeware

SIMS FOR THE THINKING MAN

What can X-Plane
and Fly!2K offer?

PLUS ALL THIS INSIDE:

CFS II • Legendary Aircraft • Private Pilot • Radar Contact • FS Clouds •
VFR Scenery • 737 & 757 for Fly! • Voodoo 5 • Speakers • and much more...

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Inside the Defence
Helicopter Flying School

SEPTEMBER N° 6 : UK GBP £4.99 EUROPE €6.99 ROW £8.99



Editor's Letter

PC Pilot hits a six...

As PC Pilot rapidly approaches it's first birthday in September, we'd just like to express our thanks to all of you who've helped to make us the last word on flight simulation in less than a year. Your letters and e-mails to us have been fascinating, thought provoking, critical and constructive, but never dull! Keep them coming to mail@pcpilot.net.

We've seen a few changes over the last year and the latest is that Mike Clark, our editor, has decided that after a busy time getting PC Pilot firmly established, he's heading off to concentrate on the many other projects he handles, not least his flight sim e-mail newsletter, The Mag (www.themag-fs-news.com). We'll miss Mike, but he's not going far and he'll be staying on at PC Pilot as a valued contributor.

Elsewhere, our celebratory champagne corks are coming to land in parts of the flight sim world that are all doom and gloom. All we keep hearing is that Microsoft will concentrate all future development of 'leisure software' on their new console, X-Box and you can't fly Flight Simulator 2000 on a console (or on a 1 GHz Pentium, some cynics might say). Hasbro admit that B17 II will be their last flight sim (never say never, boys) and Looking Glass, developers of the beautiful but limited Flight Unlimited III have gone under, allegedly as a result of Electronic Arts decision to stop further flight sim projects. We also hear that Pixel Multimedia (developers of Janes F/A-18 and IAF) are out of sims and into creating platforms for multi-user arcade games.

However, we're of the opinion that this is the best time for flight simulation since the Wright Brothers created an opportunity for our unique hobby to exist. The general reduction in defence spending around the world has led to a shortage of experienced ex-military pilots moving into civil flying. The cost of private flying (especially in the UK) has also cut numbers. Airlines are not going to invest the huge sums required in training airline pilots from scratch and the net result is not enough pilots. This deficit is already making waves in aviation circles. The FAI (Federation Aeronautique Internationale) has told its members, including our own Royal Aero Club, that a significant part of their future lies in closer links with 'cyber flying' (as they call it). The AOPA (Aircraft Owners and Pilots Association) are actively lobbying the government for the PPL to be made easier (and cheaper!) and the possibility of PC flight simulation experience going towards a licence has not been discounted. In our article on the DHFS you can see that even military pilots are beginning to benefit from PC flight simulators, albeit only for instrument practice at the moment.

All in all, while the 'computer games' aspect of flight simulation is on the wane, the people who really count in aviation are beginning to take us seriously. The policy of 'get 'em while they're young' has always worked and aviation now sees its future as much on a monitor as at an air show. Think about it, in this issue we're reviewing three standalone sims that don't come from Seattle. We think the future's going to be pretty rosy!



Dermot Stapleton
derm@pcpilot.net

COMMS

It's not just a Flight Simulator world!

FROM: Dan Houlihan

I am very interested in your magazine but wanted to ask a few questions before subscribing. Is your magazine Microsoft Flight Simulator specific? Whilst I am an avid flight sim lover, this is one I never purchased. I have Airline Simulator 2, PS1, Elite and X-Plane and my question is: are there any columns, reviews or articles on these sims? I am very interested but I don't want 'flashy' articles on Microsoft's Flight Simulator, I would like to see articles on Airline Simulator 2, PS1, X-Plane and suchlike.

We reply:

Hi Dan, we do cover quite a few Flight Simulator 2000 products, but generally because there is a lot of stuff out there! We also have tutorials, hardware coverage, news and previews/reviews of all type of simulation products, so we are certainly not specific. We covered Airline Simulator 2 in our first issue and Elite in Issue 4. However, look no further than the current issue for X-Plane and PS1. We've been working on both of these for quite some time. Kenji Takeda, who reviewed PS1, has had to lie down in a dark room to recover from the strain of reviewing this huge beast and Joe Lavery is still on another planet after his trip in X-Plane. We always try to respond to reader's requests and as far as a subscription goes, why not try an issue and see what you think? The first issue is free and we offer a money back guarantee!

The Crew

Dermot Stapleton

Dermot has spent many years as freelance journalist and radio script writer. His father, who served on Bomber Command during WWII, got him hooked on anything to do with aviation from an early age. Dermot can often be found aboard a microlight, clad in helmet, goggles and Sidcot suit. He has been dabbling in flight sims since FS 4.0 and has been involved in the background of PC Pilot from the start. He finally took the plunge a few months ago and came on board full-time as managing editor.

Greg Gott

Greg has held a private pilot's licence for 11 years and enjoys cruising around the New England countryside in Skyhawks and Archers. Greg is a genius with hardware and knows many different types of system... being one of the first 'overclockers'. Some of his much-praised articles can be found at www.simflight.com.

Mike Hambly

Mike Hambly, retired RAF veteran, is widely known for his freeware and payware product sound sets. He has seen a great many changes in aircraft types from the days of the Vampire through to the Harrier and Nimrod. He began developing his own sounds for flight sim as a hobby and is now recognised as one of the world's top sound designers.

Stephen Heyworth

Steve has been a qualified Pilot since 1984. He has flown many planes from the Piper and Cessna stables as well as more entertaining planes like the Tiger Moth, Chipmunk, Bulldog and Slingsby. He is licensed to fly by day, night and instruments. Steve has also written his own flight simulator using C++/DirectX and therefore has a good understanding of how flight simulators are programmed and work.

Joe Lavery

Joe has been a flight simulator enthusiast since the BBC Micro days and became interested enough to complete a PPL in 1996. He began his writing career covering mainly graphics and CAD reviews due to his background in this area, but more recently has hosted a flight simulator column covering all aspects of simulated flight.

Bill Stack

Bill Stack has written numerous books and articles about business, management and marketing and has trained thousands of business and government professionals. With his flight simulation books, he applies his training background to help fellow flight simmers reach their greatest potential in flight skills.

Kenji Takeda

Kenji is an experienced computer journalist who also happens to hold a Master of Engineering degree in Aeronautics and Astronautics, a PhD in Aerodynamics and is a professional member of the American Institute of Aeronautics and Astronautics (www.aiaa.org). When he's not flying for PC Pilot, he is busy performing research in aircraft noise and finding ways of reducing it to help make our airports quieter in the future.

Mike Clark

Mike has been a journalist for 15 years with a background in PR and marketing. Mike became hooked on Flight Simulator in 1995 and in 1997 started work on a free e-mail flight simulation newsletter called The Mag. Since then The Mag has grown to a regular circulation of over 100,000! Mike has written many reviews and interviewed some of the biggest names in flight simulation and real aviation.

Christopher Jarman

Chris is a retired Fleet Air Arm aircrew, holds a private pilot's licence and also an AOPA aerobatics certificate. He does most of his real flying from Old Sarum, near Salisbury and he has been involved with flight sims for the last five years, involved in beta testing of some products as well as writing for PC magazines. You can find out more at his website: www.argonet.co.uk/users/quilljar.

Len Hjalmarson

Based at Kelowna, Canada, Len's background is 15 years in journalism and he is a co-founder of the popular www.combatsim.com. He became hooked on PC flight simulations in 1989 and comes by his interest in military aircraft and history from his father who served in the RCAF. Len has written many previews and reviews and has interviewed a host of military pilots, both serving and retired. He's also a PC hardware nut.

A huge post bag this month means no mugshots, but if you want to check out our artists impressions, they are all at 'the crew' on www.pcpilot.net.

Entente cordiale

FROM: Serge Vonstein

Congratulations to the PC Pilot crew!
Five issues and five opportunities of being happy, even for a 'froggy' (I hope you will understand my 'Frenchlish') I read each magazine again and again, and each time I really enjoy it!
After reading your review of Flight Unlimited III, I purchased it and I'm very glad of it.
But please, could you tell me your secret to catching the nice screenshots I saw in issue 3?
My print+screen key loads nothing in the clipboard.
Flying at sunset, just when ground lights turn on, above San Francisco or Seattle is something unforgettable, and I'd like to save it.

Nous repondons:

Bonjour Serge, et merci. En reponse a votre lettre: Your 'Frenchlish' is certainly better than our French! To get proper screenshots you will need a professional utility called Screen Thief that you can get from www.zdnet.com for \$40.00. This will grab your screens in all their glory.

"I love the smell of PC Pilot in the morning..."

FROM: Noel C. Fairhurst

Thanks for the continuing supplies of PC Pilot. It is a superb magazine - one of the best investments I have ever made (it even has a high quality SMELL about it!).
As a keen aviation enthusiast, I was especially pleased to read of your free offer of a download of English Airports - I am a dedicated, 72 year old simmer, living 1 mile from Runway 24 touchdown point at Manchester Airport.
Accordingly, I followed your straightforward instructions to achieve the download, only to be told, at the Security Check ---- "Authorisation required..... etc. etc". Result - No download! Can you please explain what has gone wrong and how I can get hold of the highly desirable scenery? In the meantime - carry on the good work!

We reply:

Glad you like the smell, Noel.

Gary, Dave and Tammi at our production offices spend many lonely hours soaking the pages with 'L'essence de Sim'.

As far as the English Airports download was concerned, we had a huge number of visitors who went straight to the site for the download. When the server was really busy (must put another battery in the Atari) it occasionally rejected the password. The solution for Jonathan was to try in the morning (UK time) before our friends across the pond got to work and logged on. The handful of other readers who told us about a delay should now have the download.

Memories of Pantellaria

FROM: P.T.

As an ex-RAF aircrew I don't tend to have a lot to do with combat sims these days, but spend my time doing a very occasional bit of leisurely flying on my friends' PC. However, a PC Pilot subscriber showed me your review of Tuskegee Fighters in the last issue and I saw that it features the Island of Pantelleria. I checked my log book and sure enough, on June 6th 1943 (exactly 57 years to the day after reading your article) I was part of a force of Bostons from 18 Squadron that attacked gun emplacements on Pantellaria with a Spitfire escort. We were jumped by Me 109's and FW190's and lost one Boston, with an Me109 shot down by our escort. My aircraft (AL752) was damaged and I was wounded in the back.
I have decided to get Tuskegee Fighters to have a look round Pantellaria again (I must be mad). Keep up the good work at PC Pilot and thanks for reminding me in such a unique way.

We reply:

Thanks for your mail P.T. we're glad you liked the article. Your letter prompted some discussion down here about what will and won't work in CFS II when it comes out. The general conclusion was that anything that works in FS2000 will be OK in CFS II, but CFS only add-ons like Tuskegee Fighters won't work. Mind you, the only way to find out as usual will be 'buy it and try it'. We'll keep you informed!

We recommend.....

FROM: Jonathan Slade

Thanks for the great magazine. I'll definitely be renewing my subscription! I've been flying around the world in flight sim for some time now but I'm a complete novice when it comes to helicopters. Basically I'm looking for a good combat chopper sim, with good gameplay and nice graphics, but one that will run on my PC (I have a Celeron 333 with 64Mb RAM, and a 32Mb graphics card).
P.S. Please continue your excellent downloads section, but please continue to include planes for FS98 as well, because I don't have the horsepower for FS2000.

We reply:

Thanks Jonathan and don't worry, the downloads are here for a while yet. The only chopper sim worth considering at the moment is Enemy Engaged and for a close look, see our review in Issue 5 and the demo on the cover CD. It should run ok on your machine but you might need a bit more memory. The graphics are excellent and we think it is better value than Gunship! If you're into helicopters, check out www.members.aol.com/keith777/helipad.html - this is Keith's Virtual Helipad and always has some useful chopper stuff on it.

Around the world in 17 days

FROM: Arthur Grimmer

Any chance you can give a mention to our VA, Knight Air? I am a flight captain with them and I am currently on a virtual round the world flight by Learjet 45 with a panel I downloaded from www.japan.co.jp/~durst. My aim is to visit every country in Flight Simulator 2000 - currently I am on leg 22 between the Czech Republic and Austria
My route so far has been England (London Heathrow) - Norway - Sweden - Finland - Estonia - Latvia - Lithuania - Belarus - Ukraine - Moldavia - Romania - Bulgaria - Greece - Macedonia - Albania - Yugoslavia - Hungary - Slovakia - Poland - Denmark - Germany - Czech Republic and I'm now en route to Austria. I am estimating approximately 230 take offs and that it will take me roughly 400 hours flying time. I'm hoping to finish next year.

We reply:

Good luck with your challenging flight, Arthur. We quickly worked out on the PC Pilot abacus that 400 hours is seventeen days solid flying! Keep us posted on your progress and for details of Knight Air check out our regular VA's section.

A Pro Pilot respectfully requests

FROM: Mansour Hassanzadeh

I am one of your readers and the magazine is a great one - I love it. Is it possible for you to put an upgrade patch for Pro Pilot-99 on next cover CD that you mentioned in last issue? I would be very grateful.

We Reply:

Your wish is our command (we always respond to flattery). You'll find it on the cover CD in the folder marked 'Patches'.

NEWS

For daily news updates log on to www.simflight.com

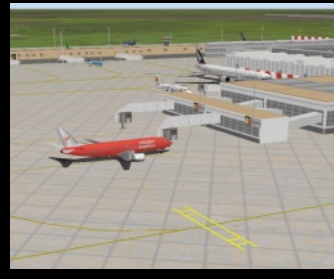
PC PILOT SPECIAL
English AirportsFREE! for Flight
Simulator 98

SimMarket.com's ShareCenter and Barry Perfect have teamed up to kindly offer PC Pilot readers a unique download of the popular shareware package called 'English Airports'. Normally, for the six airports in this collection you would pay \$19.95. However, in a special offer to PC Pilot readers, they gave us three airports for free in the last issue and another three with this issue.

The latest exclusive installation for Flight Simulator 98 contains Heathrow, Gatwick and Luton. You can obtain this special download by visiting <http://www.simmarket.com/freeoffer/pcp6> where you will be asked for a user name, which is 63001362 and a password that must be entered in lower case.

The password is a special word found in this issue of PC Pilot, so make sure you have your copy handy before going online. We've fully tested this download, so if you do experience any problems, make sure your password is in lower case and that the number is correct. Occasionally, large numbers of users downloading at the same time slows the server, so if you can't get on or have your passwords rejected, try at a time when the US is offline and the Internet is quiet.

NOTE: Before you ask, no, this download will NOT work in Flight Simulator 2000. It is for Flight Simulator 98 only!

All the
sevens

Phoenix Simulation Software has reopened their website and online shop. They've also released their Boeing 777 in United Airlines livery. The 777 features include what sounds like more moving parts than a real one! The panel includes an operating Honeywell FMS, 4 multi function LCD displays, as well as overhead and centre pedestal. The 777 is available as a download from their website. Also available is the manual for the 777 - free of charge. For more information and pictures go to www.phoenix-simulation.co.uk.

Sticking to the point

ThrustMaster announce new HOTAS stick



Jump into any modern military jet fighter and you will discover that the pilot has a control stick in each hand and that each of these sticks is loaded with control buttons, each dedicated to a different function. ThrustMaster was founded in 1992 by an ex USAF fighter pilot and tailored for the high end HOTAS (hands on throttle and stick) controller market. They modelled their gear on the real thing and made it fully programmable. This allowed the PC user to simulate not only

Flight Director '99

Flight One has advised that they've released a free update for users of Flight Director 99, the final update for the program. This update resolves some compatibility issues with Flight Simulator 2000 as well as some added features to make flying a bit more fun. Steve Halpern, the head honcho at Flight One says "although we are focusing almost entirely on Flight Simulator 2000



development now, we know there are many users of Flight Director 99 with Flight Simulator 2000, as well as some that may not have used it with Flight Simulator 2000 before. You can get this update by visiting <http://www.flight1.com>.



"Never in the field of simulated conflict has a product been anticipated by so many, for so long..." We are told that the forthcoming Battle of Britain sim from Empire is still on target for release in September. When we said to Rowan Software, the development team: "went the day well?", they naturally answered

"yes, we're on target for tonight". However, we think they'll be lucky to get it out in time to coincide with the 60th anniversary of the real battle. We know that the excitement is becoming a matter of life and death for some readers so here's the usual impressive screenshots to give you a brief encounter.



and James Hallows of Fox Two Pro fame has been invited on board to produce the new package. We're told that for those familiar with the high g forces required to make a snap roll using the ThrustMaster F22 Pro, variable spring tensioning will be available for the new stick.

The most creative feature of the HOTAS 2000 project will be interchangeable handles, allowing for the exchange of control sticks. The standard unit will come in the F-16 format, but will sport a metal axis that functions as a mounting system. A simple connector will allow a user to detach the handle and replace it with one of several other add-on handles: Su27 Flanker, Eurofighter and possibly the MiG 29.

The Royal
Aero Club
Trust
photographic
competition

The Royal Aero Club Trust has recently announced details of a photographic competition that has a particularly impressive line-up of prizes. They include trial flying lessons, tandem parachute/skydiving jumps, cameras, visits to the Battle of Britain Memorial Flight, Microlight lessons... and this is only a selection.

The competition, on the theme of 'The Exhilaration of Flight', is open to adults or juniors and there's a £10 entry fee (£5 for juniors) that goes towards the RAeC Trust's charitable work in helping disadvantaged young people to participate in air sports, providing training schemes and equipment and maintaining our aviation heritage for future generations. Entries can be in any format including 35mm slides, prints or electronic images on CD-ROM. The rules say that "digitally manipulated images are acceptable" - we might have a go with some screen shots! Closing date is 1st October, so you'll need to hurry up. Entry details from www.royalaeroclub.org/trust.htm or by writing to:

The RAeC Trust Photographic Competition
BHPA
Old Schoolroom
Loughborough Road
Leicester
LE4 5PJ

Good luck to any budding David Baileys out there - if you win one of the PC Pilot subscriptions we've donated as prizes and you already subscribe, ask them to swap it for a flying lesson.

CH Products
plays the yoker

PC Pilot recently attended an exclusive launch at the American Embassy for the new USB yoke from CH products. As well as the novelty of a full body search by US Marines at the reception desk, we had a very extensive demonstration of the USB yoke. It is being marketed in the UK by Virtual Reality and their MD, Bob Sidwick, put the system through its paces for us with Fly!2K and Flight Simulator 2000. It certainly felt very fluid in operation and boasts impressive features such as five axes of control, including pitch, roll, throttle lever, propeller lever, and mixture lever. There are 19 button functions, including gear switch, flap switch, 8-way hat switch, two 2-way rocker switches, and 4 push buttons.

CH told us that it will be in the shops around the end of August and will be available simultaneously in Europe and the



Keep your hands where I can see them...



US. Price is quoted at £159.95 incl. VAT and you can find out more at www.virtualrealityuk.com.

From Russia with love



There's been a lot of talk for quite some time about IL-2 Sturmovik. This is a standalone combat sim based on the Eastern front in WWII and developed by a Russian team who should have the necessary credentials for producing a product about this huge theatre of operations. It is centred around the Ilyushin IL-2, an innovative Russian aeroplane, very similar to the Fairey Battle and designed for ground attack work. Known as the Sturmovik (loosely translates as 'stormer'), its combination of firepower, armour and decent performance was unparalleled at the time and it

was virtually a flying tank. The Germans nicknamed it the 'cement plane' and Stalin said they were "as necessary to the Red Army as air and bread." So many were built that the total exceeds that for any other aircraft in history.

The new sim will have 17 flyable Russian, German and American aircraft and 21 other non-flyable types. Novel features include the opportunity to take on the role of gunner in the IL-2 and a variety of different types of missions and online combat. The developers claim that their flight model is unique in its level of realism and has been designed with the aid of veteran WWII pilots.

It sounds like a very exciting competitor to Combat Flight Simulator II (Lada or Cadillac, the choice is yours) and could certainly appeal more to Europeans, as CFSII is based in the Pacific. However, although the developers should be finished in September, the European release is unlikely to be until next year and the US is still in negotiation. The images we've seen so far look impressive, so we'll watch progress with interest.

HARDWARE DRIVER
UPDATES

Creative AGP Wizard

Version Available: 1.0 9/6/00
http://updates.zdnet.com/products/pr_12585.htm
Standalone utility software for Creative's AGP graphics card running under Windows 95, 98, NT, 4.0, and 2000.

NVIDIA RIVA 128/128ZX

Version Available: 4.00.1381.0341 06/06/00
http://updates.zdnet.com/products/pr_12506.htm
NVIDIA RIVA 128/128ZX driver for use with Windows NT 4.0.

NVIDIA RIVA 128/128ZX PCI

Version Available: 4.11.01.0337 06/06/00
http://updates.zdnet.com/products/pr_12505.htm
PCI driver for NVIDIA RIVA 128/128ZX for use with Windows 95/98.

NVIDIA RIVA TNT2/TNT
Detonator Drivers for NT

Version Available: 4.00.1381.0522 06/06/00
http://updates.zdnet.com/products/pr_6504.htm
These TNT/TNT2 Detonator drivers are for Windows NT.

NVIDIA RIVA TNT2/TNT
Detonator AGP/PCI Drivers

Version Available: 4.12.01.0522 06/06/00
http://updates.zdnet.com/products/pr_6502.htm
Latest build NVIDIA RIVA TNT/TNT2 Detonator Driver for Windows 95/98.

NVIDIA RIVA TNT2/TNT AGP Drivers

Version Available: 4.12.01.0522 06/06/00
http://updates.zdnet.com/products/pr_6500.htm
The latest build NVIDIA RIVA TNT/TNT2 Detonator Driver for Windows 95/98 AGP.

NVIDIA Detonator 2 Drivers for
Windows 2000

Version Available: 5.00.2195.0522 06/06/00
http://updates.zdnet.com/products/pr_12501.htm
These drivers must be installed by a user with Windows 2000 administrator privileges.

Diamond Stealth III S520/S540

Version Available:
4.12.01.0256-8.20.16 31/05/00
http://updates.zdnet.com/products/pr_6487.htm
Windows 95/98 drivers for the Stealth III S540 Xtreme AGP graphics accelerator.

Diamond Stealth III S540
Drivers for Windows 2000

Version Available:
5.12.01.8003-8.30.20 31/05/00
http://updates.zdnet.com/products/pr_12443.htm
Windows 2000 drivers for the Stealth III S540 Xtreme AGP graphics accelerator.

Diamond Multimedia ViperII
Z200 Series Driver

Version Available:
4.1024.900.0019 31/05/00
http://updates.zdnet.com/products/pr_11649.htm
Windows NT 4.0 drivers for the Viper II Z200 graphics accelerator.

Diamond Multimedia ViperII
Z200 Driver for Windows 2000

Version Available: 5.12.01.9003-9.20.21 (8-9.21.01) 31/05/00
http://updates.zdnet.com/products/pr_12442.htm
Windows 2000 WHQL Certified drivers for the Viper II Z200 graphics accelerator.

Diamond Viper II Z200

Version Available:
4.12.01.9006-9.51.01 31/05/00
http://updates.zdnet.com/products/pr_10992.htm
This is the driver for both the Windows 98 and Windows 95 operating systems.

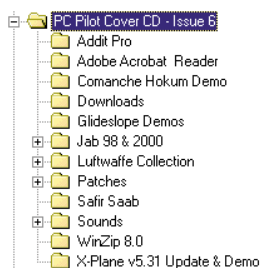
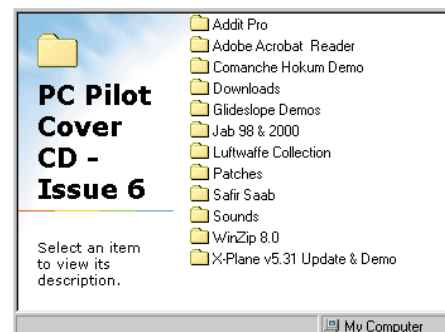
3Dfx Voodoo3 Drivers AGP/PCI

Version Available: 4.00.1381.0391 Build 1.04.00 04/05/00
http://updates.zdnet.com/products/pr_6233.htm
Windows NT drivers for your 3Dfx Voodoo3 2000 or 3000 AGP/PCI

THE FREE CD-ROM

As a gesture of our appreciation for staying with us over six whole issues, we've compiled this great CD, packed with free products, demos and the best freeware around. Until we get free phone calls to surf the net, this is the only way to get such a huge amount of stuff in one handy package and absolutely gratis.

The CD does *not* autorun. For your convenience we've assembled the CD in a set of easy to access folders. Open up the CD up by going to 'My Computer' and double clicking on your CD drive icon. When it opens you'll see that each section is loaded into its own clearly marked folder. Double-click on the folders to open them up and see the rest of this feature for detailed descriptions of everything inside.



IMPORTANT - TECHNICAL SUPPORT

The CD and software on it, with the exception of shareware files, is free and as such, PC Pilot, Just Flight nor any of the publishers or developers of the software supplied on the CD can provide technical support. The software is supplied very much 'as is' and without support. Enjoy the CD and the software on it!



Just Flight



LUFTWAFFE COLLECTION

After their successful capture of the Enigma machine from right under the nose of historical accuracy, we got the makers of U-571 to sail up the River Cam and liberate the whole of Luftwaffe Collection from the Just Flight safe. The complete version, fully updated for FS2000, is the centrepiece of our free CD and would normally cost £24.99. The Luftwaffe Collection provides a representative selection of the Luftwaffe's finest from 1918 to present day. It's all here, from the Zeppelin to the EF2000. There's even a Mig 29 in united German colours plus some interesting historical aircraft such as the twin rotor Flettner helicopter. Try this - get the JU-87 Stuka up to about 15,000 feet, open the throttle and dive. You'll hear the characteristic 'blitzkrieg' scream of the

air horn as your speed increases. Very impressive (it made us scatter for cover!)

If you want to get stuck in without reading the manual, click on the icon marked 'Start', which will install it into FS98, 2000 or CFS. For the more conscientious, the manual is in PDF format in the same folder, just make sure you have Adobe Acrobat Reader installed. If not, see below!

PLEASE NOTE that the HUD (Heads-Up Display) option on Luftwaffe Collection is not operational in Flight Simulator 2000. This feature only works on appropriate Voodoo 1 & 2 cards when run in either Flight Simulator 98 or Combat Flight Simulator.

ADOBE ACROBAT

If you haven't got Acrobat Reader, you'll need to install it from this folder in order to read or print out the Luftwaffe Collection manual.

WINZIP 8.0

The latest version of the world's most useful utility. You'll need this installed before you can open any of the zip files on the CD. Please note that this is shareware and you should register and pay if you want to use it on a regular basis.

GLIDESLOPE SCENERY DEMONSTRATION

Take a look at our review of Glideslope's North West England scenery on page 18 and then judge for yourself with this free demonstration. Click on the folder marked Glideslope Demos, click on the icons and have a look at this new scenery for Flight Simulator 98 and 2000. There's also a demo of the very latest Lake District scenery, due to be released very soon.



SOUND FILES

Recognised expert on aircraft sounds, Mike Hambly, has put together a selection of his custom sounds for Flight Simulator 98, 2000 and Combat Flight Simulator. Open up the folder marked 'Sounds', read Mike's useful notes (marked 'must read this') and unzip some excellent custom audio. We then suggest you read our comprehensive review of PC speakers on page 56 to make sure you get the most of this free noise.



DOWNLOADS

PC Pilot has compiled a bumper package of the very best downloads available. Click on the download folder and enjoy the zips inside.

If you aren't sure what to do, see the feature on page 40 that explains how to load freeware files with the minimum of fuss. A full list of details for all the downloads is on page 43.

ADDIT PRO AND JAB98/2000

Once you've read our special feature about downloading on page 40, you'll be able to use these two utilities to make downloading a painless exercise. The folders are marked up 'Addit Pro' and 'Jab 98 & 2000'.

COMANCHE HOKUM DEMO

Open up folder marked 'Comanche Hokum demo', click on the icon marked 'Setup' and follow the on screen instructions to install this great demo.



SAAB SK 50 SAFIR

A late arrival to the download section, so Kevin White's fantastic Saab SK 50 Safir gets its own folder. Click on 'Safir Saab', open up the zip and extract it into your FS2000 folder to fly this excellent trainer.

The SAAB Safir was designed as a four-seat trainer or light transport aircraft and first flew in November 1945. Safir's served in 21 countries and with the Tunisian, Austrian, Ethiopian, Norwegian, Finnish and Swedish air forces.

This aircraft is painted in the camouflage pattern adopted by the F5 Training Wing operating from Ljungbyhed, Sweden. Following retirement from Flygvapnet (Swedish Air Force), it is now civilian owned with the registration SE-III.



PATCHES AND SDK

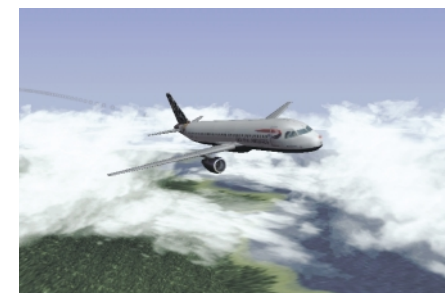
The very latest patches for simulations, including Enemy Engaged - Comanche Hokum and Apache Havoc can be found by clicking on the folder marked 'patches'. We've also got the latest updates and fixes for Airport 2000 Volume 1 which allows you to install the FS98 version into FS2000, Falcon 4.0 (US & UK editions only). For those of you still in the glorious nineties we have the latest update for ProPilot '99 (UK only). For the two heavyweight sims we've got equally heavyweight patches, 77.5Mb for Fly! (tough luck, BT) and the updates for both versions of FS2000 (please make sure you install the correct patch for your version).



If you've still got room after this feast, there's a dessert of SDKs (software development kits) in the FS2000 folder. If you don't know what an SDK is used for, we'd suggest you pass on these and move on to the port and cigars.

X-PLANE

In the folder marked X-Plane version 5.31 you'll find the latest update if you already have this amazing sim. If not, this update will also run as a fully flyable but time-limited demo. Have a look at our review of X-Plane on page 21 for all you need to know about the Laminar Research wonder.



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The world's smallest competition: send us your favourite flying joke by e-mail or to the address above on a postcard and there's a free product from our archives for the best one.

WHICH? Flight Sim



We recently had to bid a sad farewell to Looking Glass, the team behind the visually charming Flight Unlimited III. Real life pilot and lead developer from Looking Glass, Peter James, gives us a very fair overview of the pros and cons for the various simulators on the market. Peter's no-nonsense summary originally appeared at www.flightsim.com

Loads of people keep asking me for my opinion on which sim is better – Flight Simulator 2000, Fly! or X-Plane? I always tell them Flight Unlimited III! However, since so few of you could find it (hint, I am still angry), I certainly must admit to telling those who write to me, that they're all the best. Each one is better for a different reason and suits each person differently. Most people want an 'all in one' sim and I think that's going to be impossible to find. Most diehard enthusiasts like myself use all three sims about equally. What's £100 or so spent on three sims that will give you years of fun and experience? It sounds to me like a real bargain. However, people still like to know exactly which one they should get first (or last) and usually this depends on a recent or planned hardware upgrade. I'll make the answer fairly short and easy if you happen to be in this sort of quandary.

Flight Simulator 2000

Could be the best of all and service every requirement across the entire range from fun to student pilot training and more. If only the motion quality was smoother and less interrupted by stutters and image loading. This is just the result of poor programming. To run Flight Simulator 2000 at blazingly fast speeds, in order to get a perfect feel of flight, you'd need a PIII 850 or greater. I have not seen Flight Simulator 2000 on one, but I certainly

can't say it runs really well on my PIII 500. In addition, the interface of Flight Simulator 2000 is not so easy and many hours of configuring is needed to get performance and flight qualities acceptable. Its open design allows for unlimited downloads of new aircraft, sounds and instrument panels. In some cases this is bad, because maybe all that the new student pilot wants is to get into a new plane and fly it. In Flight Simulator 2000, this can't be done quickly, without fiddling for days, trying to get things right. However, it does feature the best scenery of any sim.

Fly!

My pick for number one, if you're a real pilot or student pilot, needing to learn the exact systems and panel functions of a late model Cessna 172. Experienced real pilots will enjoy Fly! for the systems-rich environment and IFR weather rendering. I find Fly! much more useful for learning advanced aircraft systems, getting used to using real checklists and performing the busy duties of a real flight. It is the only sim that resembles the workload of a complex cockpit, along with the full visual high-resolution graphics. Flight modelling is excellent as well, but again, you've got to see the full cockpits to believe it! Fly! would be the best, if the weather was as good as X-Plane, because frame rates are better than Flight Simulator 2000.



X-Plane

This truly has something for everyone. If the slightly limiting visual scenery and some generic panels are okay for you, then the smoothest frame rates and best flight modelling of all the sims will really wow you! In addition, X-Plane features the best variable weather, settable weather and violent weather, of any flight sim. X-Plane has the best thunderstorms and will teach you better than any other sim about the dangers of wind shear, microbursts and proper avoidance. In addition, icing, slick runways and system failures will challenge you. If this sim had the systems and panels of Fly!, and the scenery of Flight Simulator 2000, it would be the best.

There you go, it's impossible to pick just one. You CAN'T! Enjoy them all, get them all and use them all equally. You'll be glad you did. However, if you do have a machine that is limited in performance I would recommend only X-Plane, especially if you are on anything less than a PIII 500. Fly! will run well on a PIII 500 but Flight Simulator 2000 will only manage to stagger through the 20 fps barrier on faster machines with lots of RAM.

Peter James

Peter James can be contacted by e-mail at peter@flightsim.com

Combat Flight Simulator II:



WWII Pacific Theatre

In the autumn of 1998 Microsoft released their first combat simulation and had an instant hit. The title, Combat Flight Simulator: WWII Europe, always suggested there would be a sequel and it finally looks like we might see it before the end of the year. This April we visited the Microsoft campus and spent some time with the Combat Flight Simulator II team, led by Tucker Hatfield. Tucker previously worked for Dynamix on the Aces series and was Director of the Red Baron II patch and Red Baron 3D. Leon Rosenshein, of Falcon 4.0 fame, is the Lead Developer on Combat Flight Simulator II.

Flight Simulator 2000 evolution

Combat Flight Simulator II is built on an enhanced Flight Simulator 2000 engine. The dull campaign of the original Combat Flight Simulator has given way to a dynamic feeling in the new version, including a logical flow from one mission to another.

Following the real-life events of the Pacific Theatre, Combat Flight Simulator II comprises over 120 missions. This is meant to be a pilot's sim as well as a combat sim, designed to give you a sense of connection to the virtual pilots in your squadron. It has the added ability to interact via radio with your wingman and flight, producing more intense and challenging missions than those of the original.

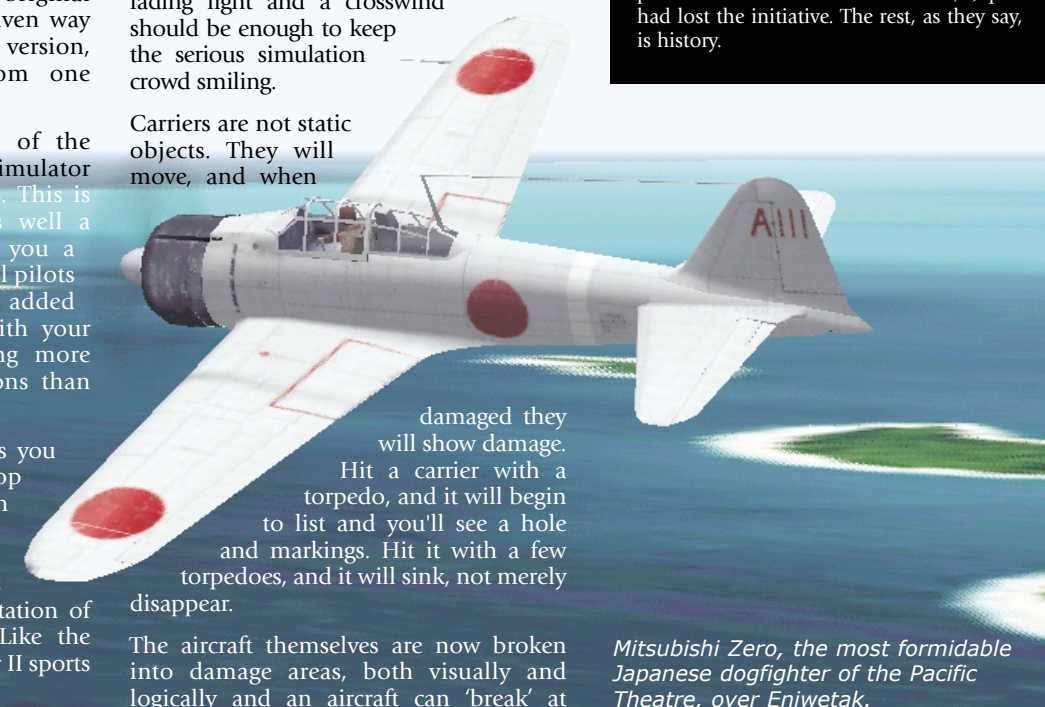
Combat Flight Simulator II gives you weather, wind, and clouds, top notch lighting effects and you can even add your own markings to aircraft. You'll see greatly enhanced damage modelling, including the graphical representation of damage in various structures. Like the original, Combat Flight Simulator II sports an open architecture.

The mission builder now has a graphical interface and includes the facility to add trigger events and use logic. Flyers can design highly detailed briefings, including voice, text, images and built in screen shots of targets and locations. It will be possible to link voice as an event in the builder itself, even recording your own voice. Random failures can be programmed into the missions, so you may find yourself losing oil pressure or your guns or landing gear might jam.

Carrier operations and damage models

The carriers in Combat Flight Simulator II look fantastic. Detail is higher than the carriers in Jane's F/A18. Trying to return your damaged Hellcat to a small carrier deck in fading light and a crosswind should be enough to keep the serious simulation crowd smiling.

Carriers are not static objects. They will move, and when



The aircraft themselves are now broken into damage areas, both visually and logically and an aircraft can 'break' at

The Pacific Theatre of Operations

Japan entered World War II wanting to secure the lucrative and strategic resources of Southeast Asia and much of China. Japan believed it necessary to neutralise American striking power in the Pacific before moving south and east to occupy Malaya, the Dutch East Indies, the Philippines, Wake Island, Guam, Thailand, and Burma. Once in control of these areas, the Japanese intended to establish a defensive perimeter stretching from the Kurile Islands south through Wake and the Marianas to Rabaul on New Britain.

However, Japan miscalculated the effect on American resolve of their surprise attack on Pearl Harbour in December 1941. In February and March 1942, small carrier task forces of the U.S. Pacific Fleet hit the Marshalls, Wake and Marcus Islands, while bombers from Australia began to harass the Japanese at Rabaul. In the spring of 1942 the Japanese pushed southeast from Rabaul to Guadalcanal and Tulagi in the Solomons. They failed to take Midway Island, and in the naval battles of the Coral Sea and Midway in May/June they lost the bulk of their best naval pilots and planes.

After Midway the Allies attempted to reduce the Japanese stronghold at Rabaul and establish Allied control of the Bismarck Archipelago. On August 7, 1942, the 1st Marine Division landed on Guadalcanal and nearby islands in the southern Solomons.

Sharp surface engagements were the result, and air battles were almost daily occurrences for a month or more after the landings. Finally, in February 1943, the 43rd Division moved into the Russell Islands. American forces then began to construct major air and logistical bases for further advances. Once the Allies became strong enough to threaten their defensive perimeter from several directions, Japan had lost the initiative. The rest, as they say, is history.

Mitsubishi Zero, the most formidable Japanese dogfighter of the Pacific Theatre, over Eniwetak.

various locations. The wing of the Corsair can break in the middle or at the root, or the tip can be shot off. 'Decals' are used to show bullet damage on these areas before they break, and after they break end caps are added so you will see structure poking out of the damaged area. Structural damage also affects the flight model:

When you take engine or radiator damage in the original Combat Flight Simulator, white or black mist streams from an imaginary point on your aircraft. Not so in the new simulation. You'll see leaking fuel streaming from mid wing, black smoke pouring from the engine or white mist streaming from a wounded radiator. Fuel management is an entirely new feature, as are drop tanks, arresting hooks and their related physics.

Expandability, views and artificial intelligence

You will be able to fly anywhere in the world in Combat Flight Simulator II and Flight Simulator 2000 scenery will be compatible. Those who want to dogfight

in San Francisco will be able to do so. You've always wanted to bomb Washington, DC? No problem. You'd like to fly a Sopwith Camel against the Corsair? Import the aircraft from Flight Simulator 2000 or select a machine from an add-on package like RAF 2000.

The original Combat Flight Simulator slavishly followed Microsoft flight sim conventions with key mapping. This time, two separate configurations will be selectable - one for the flight sim devotees and an alternative configuration for the combat simulation crowd, as well as the ability to customise. Padlock, the facility to keep the pilot's view fixed on a target, is likely to function in the same way as in the Combat Flight Simulator original, the virtual cockpit is completely new. This time the gauges remain readable while in virtual cockpit mode and snap views in the fixed cockpit immediately go to the virtual cockpit views.



The title screen. Who let Any Warhol loose with the graphics?



Quick Combat screen in the same style. The background is a fuselage skin

Computer driven pilots are improved for Combat Flight Simulator II, including joint tactics and fight and flight rules. Pilots will now attempt to exit an engagement when low on fuel or out of ammunition. The dog-fighting AI (artificial intelligence) is enhanced, with pilots more aware of their energy state and the development team has even implemented some additional ground attack types like torpedo bombing. Flyable aircraft can't mount torpedoes, but it will be possible to edit the data files yourself. You can mount a torpedo on a fighter if you like. With a bit more work, you can fly the Dauntless with torpedo (but a default cockpit). Undoubtedly someone will be adding a better SBD Dauntless for that purpose!

Loving attention to detail is evident in Combat Flight Simulator II, including adjustable prop pitch, operating cowl flaps and the chance to ditch in water and survive! Our hands-on time gave us an opportunity to see the asymmetric deployment of landing gear, just like a real aircraft. Multiplayer features remain intact from Combat Flight Simulator original. At any time, over 300 pilots can be found flying on the MSN Gaming Zone at www.zone.com. Plans are afoot to create a virtual United States Air Force on the Zone.

We expect great things from the CFS II team and now you know why. The code should be complete in August. When the original Combat Flight Simulator was released, it was described as the most stable military simulation product ever. Now that Microsoft is doing a Pacific theatre simulation, what more could we ask for? Only that the add-on boys get busy as soon as Combat Flight Simulator II is out.

Len Hjalmarson

PREVIEW

Publisher: Microsoft

Website: www.microsoft.com/games/combatfs/

Developers: Various

Price: TBA

Expected Release Date: Autumn 2000

Some you fly, some you don't...

You'll find eighteen different aircraft in Combat Flight Simulator II, some of which you can fly and others that make up the numbers.

The flyable aircraft are:

- P38F Lightning**

The twin-hulled P38F Lightning spun its props in opposite directions, avoiding any spin problem during stalls. High altitude performance was excellent where it was very fast and manoeuvrable.
- F4F-4 Wildcat**

The stubby F4F-3 Wildcat was outmatched by the A6M2 Zero, but the F4F-4 added two .50 calibre wing guns to make it more formidable. The ability to fold its wings allowed storage on the fleet carriers.
- F6F-3 Hellcat**

The Grumman F6F Hellcat arrived in volume in August of 1943. It was far faster, more durable and had greater firepower than the Zero. Flight characteristics were very forgiving.
- F4U-1A Corsair**

The gull-winged F4U Corsair became the standard US Marine fighter from early 1943, but was not considered suitable for carrier use until late 1944. Not as manoeuvrable as the Hellcat, it was 50 mph faster.
- A6M2 and A6M5 Zero**

The Mitsubishi A6M Zero, with its extremely tight turn radius, was arguably the best dogfighter of the war. Light construction made it vulnerable, but it had an exceptional climb rate. Both the A6M2 and A6M5 versions can be flown.
- N1K2 George**

The Kawanishi N1K1 George was slow by 1944 standards, but it could turn inside anything the Americans deployed and outclimb them. Heavy armament included two 7.7 mm machine guns and four 20mm cannon.

The non-flyable types are:

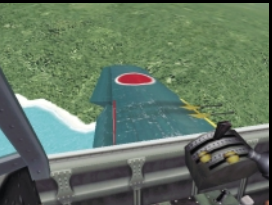
- * Ki-43b Oscar
 - * B5N2 Kate
 - * TBD-1 Devastator
 - * D3A1 Val
 - * SBD-2 Dauntless
 - * TBF Avenger
- * G4M2 Betty
 - * B-25D Mitchell
 - * C-47 Dakota
 - * P-39D Airacobra
 - * B-24D Liberator



P38 Cockpit View. Gauges with jitter!



Virtual Cockpit in the George



Cockpit left view in the George



Mixing it up. The raw beauty of the images is stunning

AETI 747-200 Classic

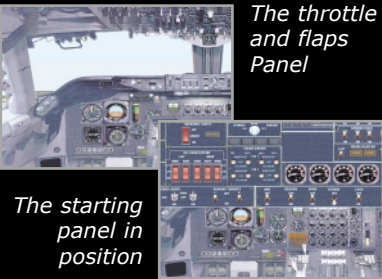
Definitely one for checklist Charlies

An evening shot of the big bird

Panel game



The complete engineer's panel



The starting panel in position

A nice innovation is the line of seven discreet icons on the lower left-hand side of the main cockpit. When clicked upon they change to the views of the different panels. In turn, they take you to the 'secondary cruise screen', the radio panel, the Flight Simulator 2000 GPS (global positioning system), throttle console, overhead panel, navigation system and finally the complete Flight Engineer's controls. Each panel can be removed by either clicking again on the icon or by selecting 'Close Window' with the middle mouse button.



Select from these icons to bring up one of the seven panels

Occasionally, an add-on to Flight Simulator 2000 comes along with a level of detail that really takes us by surprise and 747-200 Classic from AETI (available as either a download or on CD-ROM) was one of those. If your normal flying is restricted to small planes, either in real life or in sims, the huge 747 cockpit filled with so many dials will seem quite daunting at first. Apparently (we didn't count them) there are over 100 working gauges, switches and annunciators put together by top panel designer Ralph Tofflemire. To help unravel the mystery of these is a 60 page Main Manual and another 16 page Quick Start version on the CD that can also be downloaded separately as PDF files. There is enough reading matter here for anyone who needs to while away a life sentence. Included in the package are all the First Officer's checklists and practically every document that an airline pilot has to see. Three 747-200 aircraft are featured, from Air Canada, KLM, and Northwest.

When you first load the program it installs the three liveries of aircraft and puts itself very neatly into the 'Flights' menu of Flight Simulator 2000 under the title: 'AETI First 747 Flight'. You click on this and find yourself right up against the wall of the passenger terminal at Detroit Metro Field in Wayne County USA. To get you out of this dilemma there are a couple of 'Pushback' buttons on the radio panel. AETI seem to have thought of everything, including the genuine voice calls of the First Officer's checks. All aircraft include animated parts: spinning turbines, gear, spoilers and the night lighting of the cockpit, panels, passenger windows and the tail logo would rival the light show at a cathedral. Incidentally, this is the first add-on we have seen that takes advantage of Flight Simulator 2000's ability to change the aircraft tail numbers.

It's well worth reading both manuals through fully in order to get to grips with the complexity of this mighty beast. We finally admitted defeat and the good old 'slew mode' came to our aid to get us away from the terminal (perhaps we were cut out to be bush pilots, not smart-suited airliner captains). Nevertheless, it's well worth



Default start in Detroit

persevering because after only a couple of minor incidents (nothing that a lick of aircraft paint couldn't fix) and some voicing of our frustrations, we were able to manoeuvre this airborne leviathan with ease.

Finally, after some further study, we felt sufficiently qualified to start the monster, push back, taxi and take off. As you ascend and select the beautifully constructed external perspective, the view becomes really impressive. Words like regal and majestic are probably the best ones to describe the feeling when you soar through the air in this huge machine. It handles just as one would expect a 747 to handle, with dignity and style, but rather sluggishly, even on a 500Mhz machine. With default display settings switched on, the frame rate in the cockpit averages at 16.5 fps and the artificial horizon slops around some two seconds after you turn. Outside view rates are about 10.8 fps.

All in all, 747-200 provides a great level of detail for the money and is certainly the best 747 we've seen to date. However, prospective buyers should be wary of the need for a competent PC to get the best out of this expansion.

Christopher Jarman

REVIEW SCORE:

Publisher: AETI

Price: approx. £19.99

Website: http://simpilot.com

Release Date:

Developer: Ralph Tofflemire

Out Now

Pros: The most complete 747 cockpit and controls add-on available for Flight Simulator 2000.

Cons: Quite difficult to learn (but you might consider that a plus point) Heavy on memory and computer power as well as jet fuel.

System Requirements: P III 500, 64Mb RAM, 3D graphics card

Recommended: PIII 600, 256Mb RAM, 32Mb 3D graphics card

Precision Simulator 744

A gargantuan gauge fest

If there's one sight that will turn everyone's head at an airport, it's the sight of a Jumbo coming into view. Gear down, flaps and slats hanging out and with hundreds of people on board, these airborne leviathans exhibit a grace and style that is a joy to behold. Of course, pilots the world over dream of taking command of one of these legendary aircraft and mainstream flight simulators such as Microsoft Flight Simulator 2000 can give you a taste of the high life.

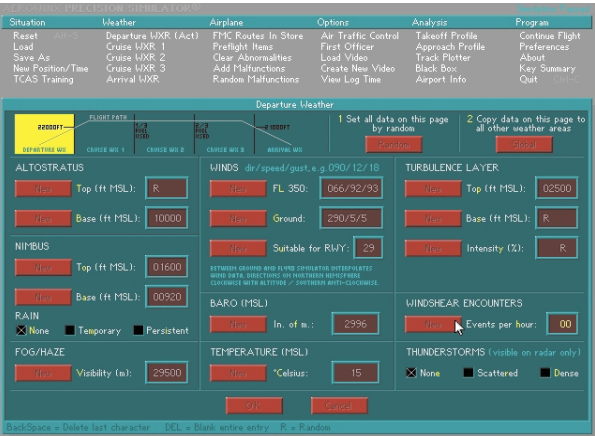
Flying one of these heavy airliners, with the responsibility of all those passengers out back, is a very different experience to joyriding in a Cessna. It's all in the details

and that's where Precision Simulator 744 (known simply as PS1) comes in. This is the third release from Hardy Heinlin of Aerowinx and if you're confused by the title don't worry, 744 is a common abbreviation for the 747-400, the latest in the Jumbo family.

PS1 aims to provide an ultra-realistic recreation of the 744 cockpit, not for leisure, but for serious flight training. This may sound daunting to the casual sim flyer, and indeed it is, so be warned. Only pilots capable of

doing the IFR tutorials in PC Pilot blindfolded with one-hand tied behind their back will find PS1 easy. But that is in no way a criticism, rather it demonstrates the success that Hardy has achieved. After all, not just anybody is allowed to take to the yoke of one of these beasts without a lot of training.

Choose the weather to test yourself in all manner of sticky situations



Fly by computer. If only all aircraft were this pilot-friendly

At its core, PS1 is a DOS-based program with seemingly few frills to the casual observer. Thankfully, installation is a breeze although there are a few caveats. Soundblaster-compatible cards must work under DOS and USB joysticks may be troublesome too. However, there is a great bulletin board on the Aerowinx web site and excellent technical support.

Forget about jumping in for a quick flight. For starters you'll have to calibrate your joystick set up, which is a chore but still a lot better than in previous versions. This is where you'll start in the 352 page wire-bound manual. A whole 11 pages are devoted to mouse, keyboard and joystick

controls. And that's the easy part. Wait until you have to read up about all of the hydraulic and electrical systems on board.

Before going that far and with your control set up calibrated, you are dumped straight into the hot seat lined up for a simple approach (or as simple as it gets in PS1). The thing that strikes you most at this point is the complexity and compactness of the display. The centre is taken up by the EFIS (electronic flight instrument system) for navigation, with the PFD (primary flight display) nestling to its left and the secondary EICAS (engine indicating and crew alerting system) on its right. This latter system is used to display a host of



The Flight Management Computer is reproduced in intimate detail. Make sure you read the manual first though

information from engine and brake temperatures to flap and landing gear deployment positions.

The overhead panel is split into several separate displays accessed easily by clicking on the central EFIS. This pops up a small window in the centre of the screen that is clickable but does not obscure the other instruments. This is critically important, as you really do want to stay in command in an emergency while extinguishing engine fires and jettisoning fuel using the overhead panel. This is a typical example of the refined nature of PS1's panel design that works beautifully in flight, even if it doesn't look quite as pretty or photo-realistic as Fly! or Flight Simulator 2000.

In order to present as many cockpit systems as possible to the deskbound captain on a single screen, there are some neat compromises. For example, the backup mechanical flight instruments are simply replicated as digital readouts at the top-left of the screen. Squished into the bottom quarter of the screen are trim indicators, landing gear and flap levers, auto-brakes and a lower EICAS.

The autopilot mode control panel sits at the top of the display and snap-scrolls left and right with the mouse. This provides efficient access to autopilot and flight director controls, although it takes a little getting used to. The full 744 control logic is simulated, as is the reality that most of the flying can be done by the computer with



We're going down, unless we can stop it. A two-engine failure may not look spectacular on-screen but it's a thrilling experience

little pilot intervention. Almost by definition, Jumbo flights are long affairs, which can be boring given the competence of the onboard autopilot and navigation systems. PS1 is utterly realistic in this sense, allowing you to fly full trans-Pacific journeys as fuel loads allow.

Familiarising yourself with the cockpit layout is a necessary evil before embarking on even the shortest trip. There is so much information packed in that it is difficult to find obvious controls and displays. However, taking time to convert onto this sim is well worth the effort if it is real commercial flying that takes your fancy.

Grasping the yoke and taking control is when the thrills start in earnest. Unlike any other PC flight sim, this baby requires the utmost care and attention to spot on the runway. Renowned for its supreme low-speed handling with flaps and slats



Uh-oh! System failures can be fully programmed, so be on your toes to avert in-flight disaster

HOBBY OR HARDCORE?



For those who want to see what it's like to pilot one of the gentle giants, but also prefer the scenic view then there are plenty of options. For Microsoft Flight Simulator users there's a huge fleet of Jumbos to choose from



If you want easy-to-install solutions then Flight One's 747-400 and Databecker's 747 Jumbo Jet 2000 provide decent renditions of this classy beast



While other sims offer fabulous external views, PS1 concentrates on the intellectual beauty of the interior



For slightly more in-flight fidelity you may want to consider X-Plane (reviewed elsewhere in this issue), which allows you to roll your own. The latest version combines excellent flight modelling with improved graphics



But if it's all out realism that you want then Aerowinx is way ahead of anything else. It's a vertical learning curve, but then this product isn't aimed at novices. If you can't afford a full-motion simulator, this is the next best thing



The world is your oyster, with over 1500 runways to choose from

deployed, you really have to think ahead when steering this much metal through the sky. Gently, gently with a deft touch is utterly rewarding though and is an addictive flying experience. Hardy has done a supreme job of modelling the flight dynamics of the 744, so following standard take-off and approach procedures (as described in the manual) result in the correct response of the aircraft. The detail is so good that many a real Jumbo pilot has been known to brush up on their technique using PS1. The thoroughly enjoyable walkthrough at the end of the manual is written by PS1 fan and pilot extraordinaire Mel Ott. Otherwise known amongst aviator circles as Cap'n Tarmack. A wonderful twenty-seven page account of his Singapore Airlines inaugural 747-400 flight provides an ideal tutorial for PS1 and is a joy to read thanks to Cap'n Tarmack's witty style.

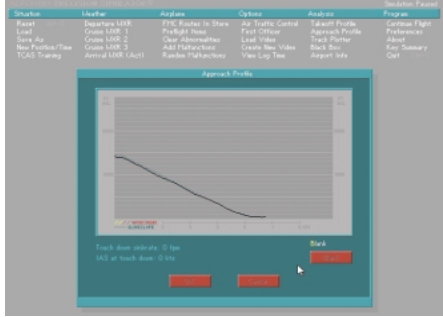
Finishing a flight end-to-end is challenging enough in one of these behemoths, but the

beauty of flight simulation is that you can try out all of those risky situations without threatening the lives of hundreds of passengers. The Instructor's screen provides access to all of the additional functionality in PS1, including loading up flight situations. These are specific to airlines and can be loaded directly into the FMC (flight management computer). Different airlines have slightly peculiar aircraft requirements and these are reflected in PS1. Notably, engines can be from the three big manufacturers, resulting in different engine displays. We told you this was detailed. Heck, you can even select exactly what kind of fuel you want to use.

To spice life up a little, well a lot, malfunctions can be preset to occur at specific times or set up to surprise according to what frequency and probability of failure you enter in the Instructor's screen. Every system can be set up like this, from total engine failure to



The cockpit is fully interactive, but learning the keyboard shortcuts makes life a lot easier

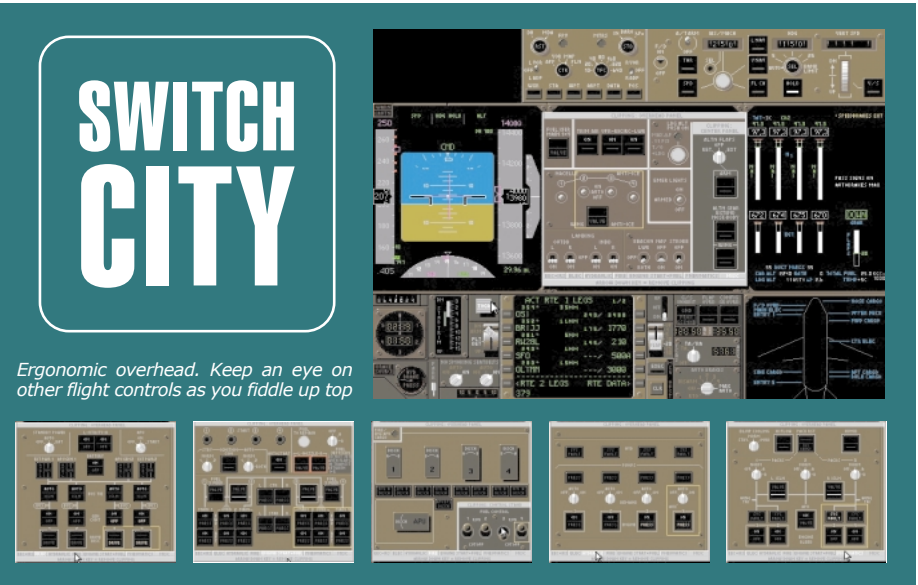


The Krypton Factor remembered. The approach profiler reveals your landing – good or bad

smoke in the air conditioning system. Having two, same-wing engines fail on final approach is both frightening and exhilarating. The response of the aircraft to the corresponding multiple system failures is so realistic that the immersion factor is absolute. A remarkable achievement given the minimalist graphics - 640x480 resolution and a postage-stamp sized external view only slightly better than Flight Simulator on the ZX Spectrum. While the visuals are crude, the audio is convincing. Engine and mechanical sounds are good and the ATC (air traffic control) adds plenty to the atmosphere. This is handled automatically by your co-pilot, as in the real aircraft and works well, allowing you to concentrate on the captain's flying duties.

PS1 may be criticised for its hard-nosed, no-frills approach but this is actually its biggest asset. By offering little compromise and simulating so much of the 744 so well, it really is as close to the real thing as one of BA's full-motion simulators down at Heathrow. For PC pilots who have reached the limit of mass-market flight sims like Flight Simulator 2000 and Fly!, PS1 is the premier league of airline simulation. It does only one thing, but it does it superbly well. This is what flying a Jumbo is really like and take it from us, it isn't easy.

Kenji Takeda



Radar Contact 2

If you've ever done any real flying then you'll already know that the role played by ATC is not only an important one but is also an integral part of the flight. Unfortunately this monitoring of airspace is something that simulators in general are not very good at - due mainly to the ATC coding not being intelligent enough to stay ahead of the course you're flying. However, all this is about to change, with the release of an updated product called Radar Contact 2 from 'JTD LLC', the collaboration of two flight simulator enthusiasts, Doug Thompson, an Air Traffic Controller in Memphis, and John Dekker, a systems analyst living in Atlanta.

Radar Contact is basically an adventure creator that imports flight plans from a number of third party flight planners and compiles them into native Microsoft Flight Simulator adventures. It incorporates realistic two-way ATC, using pre-recorded sound and chatter files, mainly derived from genuine controllers and pilots.

In order to create an authentic experience, the authors of Radar Contact have included the same amount of radio calls you would normally get on a real flight. They have also tried to make it as interesting as possible, by introducing certain random elements. You could, for instance, be asked to take up a holding pattern on arrival, or receive vectors to your alternative destination. In addition, if you're using the real weather function, you may also have your destination runway changed to accommodate the prevailing climatic conditions.

You're not allowed to deviate very far from your allotted course and altitude, or you'll be reprimanded in no uncertain terms. In fact if you really get out of shape, the controller will have an irate FAA official waiting at the gate when you land, to give you the sharp edge of his tongue.

Creating an adventure is a three-stage process, beginning with the building of a flight plan using one of the planners currently supported. We chose to use Nav 3.0 by Ted Wright because it's free,

"Ready to copy clearance..."

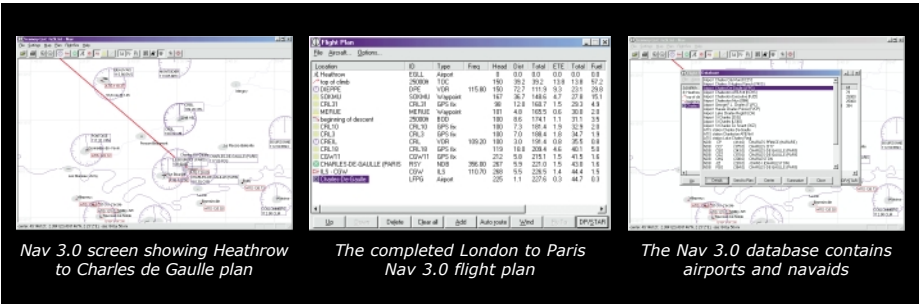


Load the adventure after setting your aircraft at the departure terminal

relatively easy to use and exports more useful information to Flight Simulator, including briefing notes, together with all the necessary radio and ILS frequencies. It will also produce a printed flight plan showing all the VORs, NDBs, and airfields on route.

Having created a plan, you launch Radar Contact and load the file, then amend the user information regarding aircraft type, navigation and your preferred 'com' frequencies. You can also define your own call sign and aircraft-handling agency, which ATC will use in all communications with your aircraft. So, for example, you can be GB1-British Airways if you want to. The final stage is to hit the compile button, which actually creates the adventure and copies it into your designated Flight Simulator directory ready to fly.

Flying the adventure is possibly the easiest part, with most of the radio work delegated to the co-pilot, who will read back all calls made by ATC. All you have to do is make sure the radio is set to the correct frequency, which is not that difficult, because Radar Contact has them all pre-set at the start of the adventure. You simply have to activate them using one of the eight Radar Contact control keys when prompted to do so. A constantly updated display in the top left corner of the screen gives you the current heading, radio frequency and distance to next waypoint. It also doubles as the menu system that Radar Contact is controlled by.



The ATC provided by Radar Contact is brilliant and although it's created from pre-recorded phrases, they react so quickly, and have such diversity, that they soon have you believing you're following the instructions of a real controller. It also provides a truly interactive experience, because you can request different altitudes en route or alternative runways on takeoff or approach.

Overall Radar Contact produces authentic, realistic flights that greatly enhance your simulated experiences.

Joe Lavery

REVIEW SCORE:

Publisher:

JTD LLC

Price:

approx. £17.75

Website:

www.flightsimmers.net/radarcontact

Release Date:

Developer:

JTD LLC

Out Now

Pros:

Provides a realistic and varied ATC environment to fly in.

Cons:

The user interface is a bit fiddly.

System Requirements:

P200 MMX, 32Mb RAM

Recommended:

P300, 64Mb RAM, 16Mb 3D graphics card

North West England Virtual Scenery

Liverpool Docks looking down the Mersey

Set the compass to North West

that you are 'flying reality' stretches the point a bit. Nevertheless, this scenery is a considerable improvement over Microsoft's default UK scenery for Flight Simulator 2000, which could easily be of Outer Mongolia. Switching from one to the other via the scenery library menu makes it very easy to compare the two.

If you are flying above 10,000 feet the realism of the Glideslope scenery is certainly impressive, but as you come down to about 3000 ft, which is where many VFR pilots fly, it all begins to look a touch bland. The motorways, rivers and fields are all there but are a bit blurred and run together as if you are looking at them with your eyes watering. Presumably this is because the linear features have been combined with the terrain, which certainly stops rivers gurgling uphill or roads swooping across lakes and bays as in some other programs. However, we did come across an annoying bug that shows up as occasional white polygons flashing on the screen, although this may be resolved in the latest updates (available at www.glideslopesoftware.co.uk).

It took us half an hour to install North West England (including a reboot) but the result was worth the time taken. Glideslope claim that it shows all the main features, including roads, rivers and towns and this is certainly true. You could probably print it out and use it as a road map. The rocky terrain and lakes are also pretty accurate and good-looking, although the statement

Apart from the airfield buildings, there are very few man-made constructions to see. It is mostly a kind of lovat and grey woolly car rug draped over the land. Mind you, we did find an active wind farm somewhere around Ribblesdale. If you fly over Blackpool, you can see a sort of Lego airfield and a huge stretch of empty beach, but no Blackpool Tower, which is a pity. Some landmarks for VFR pilots really ought to be there.

So, here we have the first serious chunk of UK scenery for Flight Simulator 2000, which has been long awaited and is pretty good until you compare it with some of the add-ons available for Flight Simulator 98 (see the review of VFR scenery elsewhere in this issue). However, on balance, despite some low frame rates, this is a good start and you can judge North West England for yourself with the demo version on the cover CD. ■

Christopher Jarman

Ampleforth looking north



Stearman over a wind farm near Ribblesdale



Looking west towards Liverpool, you can just see the house where John Lennon was born

REVIEW SCORE: 

Publisher: Glideslope Software

Website: www.glideslopesoftware.co.uk

Developer: John Miller

Price: £15.00

Release Date: Out Now

Pros: The first example of contoured mesh UK scenery for Flight Simulator 2000.

Cons: A bit bland overall, with fairly low frame-rates.

System Requirements: P233, 4Mb graphics card, 260Mb available hard disc space

Recommended: PIII, 128Mb RAM, 16Mb 3D graphics card

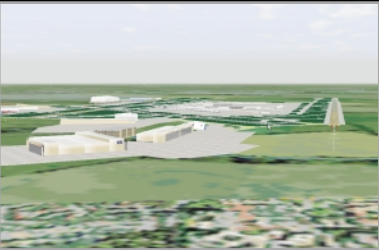
The package includes many improved airports



Birmingham



Cardiff



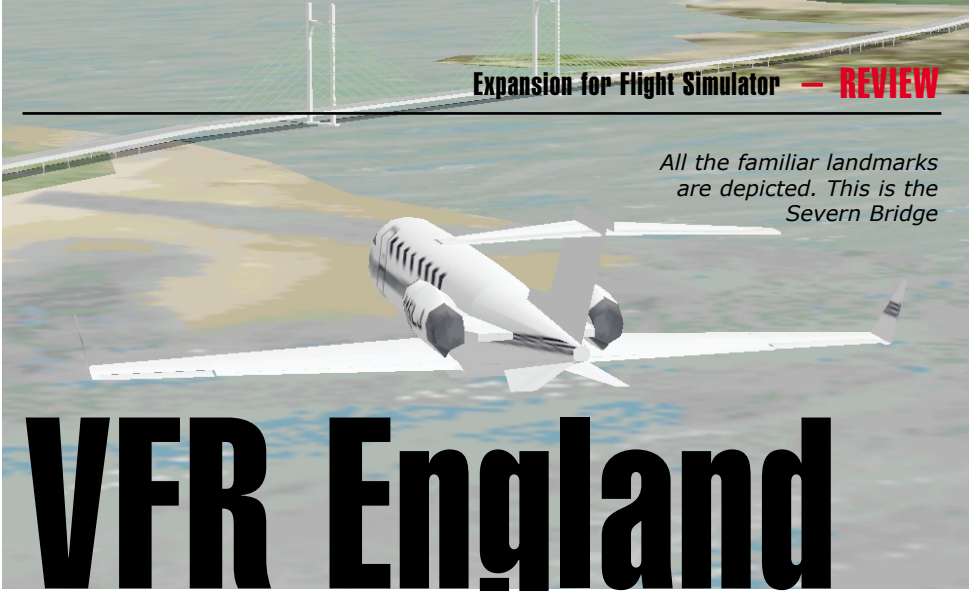
Heathrow

The launch of Flight Simulator 2000 brought a number of enhancements to our simulated flying with better graphics, more aircraft and new scenery additions, (it also brought a few new problems). Nevertheless, many of you have upgraded because of the hype surrounding it and also to make use of a whole plethora of new third party add-ons that required it.

In spite of this there are still many dedicated enthusiasts who cling doggedly to Flight simulator 98, 95 and even 5.1, for reasons that vary from hardware or money constraints, to preferring the look and feel of these earlier editions. It is a fact that with the processing power of modern PC equipment, the frame rates and fluid flight provided by older versions may be more appealing than the arguably more attractive but somewhat jerky Flight Simulator 2000 variety. Hardly surprising, therefore, that many developers are still working on and regularly releasing new products for these versions and the diehards who fly them.

This latest product from VFR Scenery Ltd., is aimed at the VFR (Visual Flight Rules) Pilots who use the mark one eyeball as their primary navigation tool, combined with a map and the most basic cockpit instrumentation. Naturally, the visual accuracy of the simulated landscape is very important under these flight conditions, because you need to confirm your current location by referring to the landscape around you. In the same way, the positions of major architectural features and obstructions have to be where you would expect to find them. Real world private pilots will often track

All the familiar landmarks are depicted. This is the Severn Bridge



VFR England and Wales

Explore England and Wales VFR

along major road or rail lines in order to arrive at a given destination and so the accurate depiction of these is another important feature.

The product covers England and Wales to a fairly high detail level and is designed to work within Flight Simulator 98, although we understand the authors are now working on a 2000 version. For those that have nightmares about scenery installations - fear not. The program comes with its own installation routine that does the job from start to finish. You simply have to point it in the right direction.

VFR England and Wales includes many new important landmarks that were noticeably missing from Flight Simulator 98 and as far as we could tell it now incorporates every airfield and grass strip in the area covered. The author has also added an enormous amount of elevated terrain, so you won't see many airfields lying on flat faceless or repetitive scenery tiles. Overall, the scenery components are good, complete with all mountain elevations, major roads and hundreds of new scenery objects designed to create an authentic representation of our rugged landscape. Airfield navigation aids (non directional beacons) where available are also provided.

On the downside the package comes with very little documentation, there are no maps or airport schematics, which could have been included on the CD. This is not a big issue for dedicated flyers who will probably use Pooleys or Jeppesen airfield manuals to find their way around, but new users would obviously benefit from a rundown of the airfields and navigation frequencies included. Other than that, the package is well produced and is a vast improvement on the default scenery. If you prefer Flight Simulator 98 then this is a worthwhile addition to improve the level of realism. ■

Joe Lavery



You won't find this ferry terminal in the default scenery



Lots of new objects are in evidence

REVIEW SCORE: 

Publisher: VFR Scenery Ltd.

Website: www.vfrscenery.com

Developer: Various

Price: £21.99

Release Date: Out Now

Pros: Provides a much broader VFR scenario.

Cons: Not enough documentation provided. Only for FS98.

System Requirements: P166, 32Mb RAM, 2 Mb video card

Recommended: PIII 300, 128Mb RAM, 16Mb 3D graphics card

Legendary Aircraft

How do you get them all in such a small box?

The first time you see Legendary Aircraft, the latest offering from add-on specialists Just Flight, you might be tempted to make a quick calculation. If you divide £24.99 by 226 (yes, two hundred and twenty six) aircraft, the cost per plane works out at just over 11p (about half a crown each, for anyone non-decimal). This looks like exceptionally good value and it is, if you just want a lot of aircraft, in one box, to add on to Flight Simulator 2000. However, there's always more than one side to every story, but possibly not enough sides to the aircraft fuselages for the more serious enthusiast.

We have to confess at this point that we didn't try every aeroplane and panel (you wanted to read our review this year) but we did some serious tours in a wide selection of types. This gave us a feel for the general quality and we had to conclude that it varied from 'must have' to 'must crash'.

Loading up is quite simple and you can either deposit all the aircraft into Flight Simulator 2000 or select them one at a time. You get a good preview shot and notes to help you select your preferred chariot. Our first ride was in a JU-87 Stuka and for a change we took it round New York. It's worth pointing out here that while Legendary Aircraft will all load into Combat Flight Simulator, the combat tends to be rather one sided. They fly, but that's about it. Hardly worth it, unless you want to go on solo reconnaissance trips and the panels don't work either. However, the Stuka was fine in Flight Simulator 2000, with a great panel, reasonable sounds and good flight dynamics.

We then tried the Lancaster (of which there are two variants) and were disappointed to see a plate stamped US Army Air Corps in the cockpit. We soon discovered that this was because it uses the same cockpit as the B-17! The comprehensive and well-written manual makes it quite clear that there are only just over seventy panels but you can mix and match them as much as you want. Flying a 747 from a Piper Cub cockpit is not to be recommended. However, despite the shortage of panels, there are loads of aircraft to choose from, including the Wright Flyer (we got that up to five thousand feet), Concorde SST, an SR-71 Blackbird, in fact a good range of examples in every category.

It must be said that you don't get this much variety without a compromise somewhere. Think of the 'Bumper Selection Box' of fireworks you can get for Guy Fawkes night. Plenty of fizzy, sparkly things, a great box and very good value if you just want loads of fireworks to light, but not the sort of thing for a display. The more serious fireworks with loud bangs are always purchased singly from a specialist. Much the same can be said for



"Otto, check the compass, this doesn't look like Ventnor radar station"



The B17 panel (above) and that of the Lancaster (below) seem to display an uncanny similarity



Legendary Aircraft and this is where it lost a lot of marks. There are plenty of better individual aircraft that can be downloaded as freeware but getting this much choice in one simple package might be just what you want.

We get many queries at PC Pilot from frustrated newcomers to flight simulation that want to expand their default aircraft and succeed in downloading new ones, only to find they can't load them up and fly them. This is an ideal purchase for anyone new to flight simulation or for whom the thought of 226 phone calls is all too much.

Derek Smalls

REVIEW SCORE:		
Publisher:	Just Flight	Price: £24.99
Website:	www.justflight.co.uk	Release Date:
Developer:	Flight One	Out Now
Pros: A great collection for anyone new to Flight Simulator. Saves on the phone bill.		
Cons: A three to one ratio of aircraft to panels is a bit of a let down. Serious simmers will avoid this one and get their modems out.		
System Requirements: PII 266, 64Mb RAM		
Recommended: PII 450, 128Mb RAM, 16Mb, 3D graphics card		

More aircraft than a budget airline

We've seen Legendary Aircraft before in it's Flight Simulator 98 version, but this new package for Flight Simulator 2000 has had more than a cursory update. Just Flight and Flight One have added some more planes and panels from their other expansions to create a huge library of generally very reasonable aircraft.

The categories are:

In the beginning: aviation classics
The world at war: classic military
The boom of the airliner: classic airliners
To the stratosphere: modern military
The jet age: modern airliners
Connecting the country: commuter/regional
Flight for the general public: general aviation



The Wright flyer skims over the beach – possibly a bit faster than Orville and Wilbur ever did



If you can remember the sixties, you weren't there. Jog your memory with this classic DC-8



A nicely detailed panel from the modern airliners category



The Stuka cockpit with what was probably our favourite panel



X-plore the world of X-Plane

Although Microsoft's Flight Simulator sits at the top of the sales tree with its huge user base and well served add-on market, it is definitely not unique. There are a number of other simulators that attract a huge following of equally dedicated users, who are just as passionate about their particular brand of distraction. One such example is X-Plane from Laminar Research, which fits nicely into this category, as a product that's relatively new by comparison and certainly not so commercial in its development, or marketing strategies.

We examined X-Plane 5.31, the latest version available at the time of review, although we ought to point out now that there are regular updates coming out on virtually a monthly basis. This ongoing development and the exchanges that fly around in the website chat room at www.x-plane.com, show that the author is committed to total support in response to the requests and suggestions from his users.

Let's begin with a short history lesson. X-Plane is distributed by Laminar Research and was the brainchild of its only employee and chief executive, Austin Meyer. They promote it as the

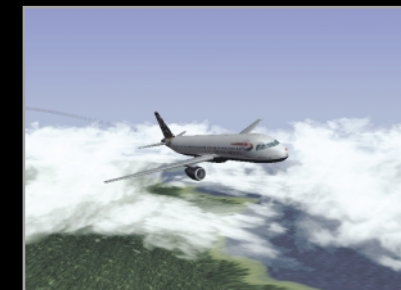
world's most comprehensive and realistic flight simulator, a statement that's sure to raise a few eyebrows in the Microsoft camp. Nevertheless, X-Plane incorporates more utilities, add-ons and features into the initial package than any other we've seen, so perhaps the claim is well founded. What you actually get for your money is the X-Plane flight simulator itself, an aircraft designer referred to as Plane-Maker, complete with full flight dynamics editing capability, a Part-Maker for creating aerofoils and a scenery editor called, (you guessed it) World-Maker. These form the main core programs but the package also includes a weather briefer capable of handling real weather data downloaded from the Internet so that your simulated flights can incorporate current real world climatic conditions.

The packaging and documentation betrays the product's development path, appearing somewhat simplistic in design, although it must be said the content certainly isn't. Austin Meyer obviously knows his subject inside out and has produced a package to challenge the top marques in the flight sim world.

SOME OF THE X-PLANE FLEET



The Cessna seen crossing the coast



The A320 looks gorgeous



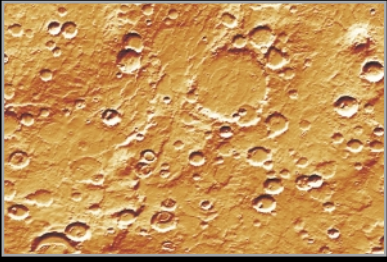
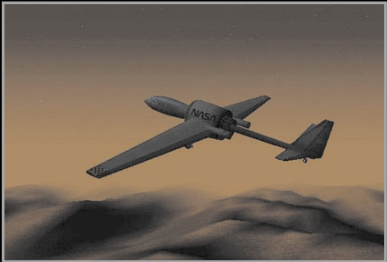
A Bonanza from well downwind



This P51 is rather bland

X-Plane is definitely something that grows on you over time, partly because it's so different to Flight Simulator 2000. When you first load it, you expect to be disappointed because of the early impressions formed by a rather 'individual' box colour. However, different does not necessarily mean worse by any means. The lack of detail in the scenery and similar deficiencies in the external views of the aircraft gradually become less important, particularly when the flight model is so smooth and in general reacts instantly to any changes in control inputs, or power settings. The package is supplied with roughly 40 different aircraft, ranging from general aviation types like the Cessna 172 Skyhawk, to big jets like the A320-100 and Concorde.

IS THERE LIFE ON MARS?



X-Plane will even allow you to fly special aircraft (the Mars Jet and Mars Rocket) over a Martian landscape. This simulation was said to be pretty accurate by one of our staff members who spends most of his time on another planet!



The transparent setting offers an interesting take-off display

Different does not necessarily mean worse

The default cockpit panel is reminiscent of flight simulators dating back to the early 1990s, but because the program has such an open architecture, there are literally hundreds of high quality freeware offerings to be downloaded from at least a dozen different Internet sites. The supplied A320 cockpit is a case in point, with fully operational instruments set into a beautifully designed backdrop, that's as good as any Flight Simulator 2000 offering. To get a flavour of what was available, we downloaded a few samples from the net and they were all of a very high standard as you can see. The control panels not only look good but are highly functional as well, with fully operational NAV radios, ADF, EFIS and Autopilot. In the case of jet aircraft you also get a rudimentary flight management system and some panel designers have now implemented GPS.

X-Plane has a huge range of menu options situated at the top of screen, which among other things provide instant on-screen charts. These cover low en-route, local virtual world, weather radar map and 3-D path, both as topographic and traditional sectional charts. In addition, you can select basic approach plates for every airfield in the X-Plane world. For those that thrive on statistics, you also have access to aircraft data output, in the form of a constantly updated cockpit display, or output to a file in a pseudo black box format for later analysis.

The main difference between X-Plane and its contemporaries is the way the program functions, or in broad terms, how it makes the aircraft fly. Many other flights simulators use a predefined lookup table to decide how an aircraft will react in any given situation. X-Plane on the other hand, concludes that by reading in the geometric shape of any aircraft it can figure out how the aircraft will fly. It uses a well documented engineering process



Try your hand at a little formation flying

called 'blade elements theory', that essentially breaks down the aircraft into smaller elements and calculates the forces applied to each part many times per second. These forces are then converted into acceleration data and then applied to the aircraft mass to determine linear accelerations and moments of inertia for angular accelerations. As you may have guessed, this information is derived from the authors description, not ours.

In any event, the outcome is a very realistic simulator that potentially provides plenty of scope for the novice pilot and enough opportunities for customisation to satisfy the veterans as well. Because the frame rate is so high, the flight models on the general aviation aircraft seem to be extremely accurate, with a better response and more realistic feedback from the controls. This is particularly noticeable on approach to an airfield, for example, where the frame rate in Flight Simulator 2000 drops dramatically as you get nearer to the ground. This can cause you to overcorrect as your brain tries in vain to

compensate for the lack of sensory data. In contrast, the landings in X-Plane tend to be more realistic and as a result, not nearly so hit and miss.

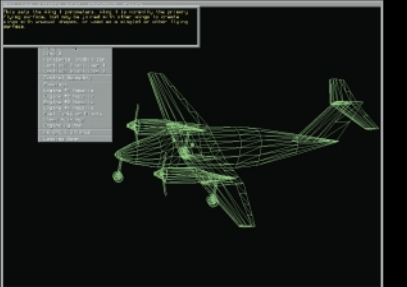
X-Plane manages to maintain this fluidity of simulated flight by utilising the latest 3D technologies in the form of OpenGL, with screen modes ranging from the standard 640 x 480 to 1600 x 1200, assuming your equipment can support it. The majority of modern 3D graphics cards are catered for, including the Voodoo and TNT2 ranges and also the later NVidia based cards.

Make the world

Another unique feature, the World-Maker scenery editor, allows customisation of the X-Plane world. Basically, this is there to improve the existing terrain files provided on the original CD, however it's nothing like the Abacus product designed for Flight Simulator. In fact, X-Plane advises against using it for creating scenery from scratch, suggesting instead that you should only use it to modify

THE PLANE MAKER INTERFACE

The Plane Maker interface allows you to design your own aircraft and cockpits from scratch. However, it's not for the uninitiated and is accurate enough for real aircraft designers to use it for testing new designs.



A basic aircraft design



Finishing off the aircraft



Cockpit design for custom aircraft



The stages of fuselage geometry

SOME EXCELLENT THIRD PARTY COCKPIT DISPLAYS ARE AVAILABLE



The Boeing 777



A nice A-320 cockpit



The right hand seat of the A-320



The Bonanza cockpit



A Boxcar on the approach

Some of the various download sites for X-Plane:
<ftp://ftp.x-plane.com/>
<http://www.x-plane.org/>
<http://members.home.net/x-plane/x-plane.html>
<http://www.g-point.com/xpcity>
<http://www.nwlink.com/~bgillam/x-plane.htm>



The weather can get pretty rough in X-Plane - the drifting snow on this runway is an excellent effect

existing scenery. This is not a real constraint because the program comes supplied with scenery for most of the United States (including Alaska and Hawaii), Canada, Europe, Japan, and Australia. If this is not enough for you then practically the rest of the world can also be downloaded free from www.x-plane.com. You can't easily create continents with World-Maker, but as most of these are already provided, there wouldn't be much point. The idea is to make your neck of the woods look as realistic as possible and there are plenty of tools to help you do so.

World Maker has four editing modes, terrain, obstacle, airport and navaid. Together, they provide a fairly comprehensive set of customising tools for tweaking terrain data, defining and positioning new objects, adding textures, airports or nav aids. For example, terrain mode is used to adjust point heights by selecting nodes on a grid, then changing the digits in a text box to set the new height. You can also move the grid points

to make coastlines appear more like their real world counterparts. Adding objects to your landscape is the domain of the obstacle mode, where the click of a button is all that's required. If you want to design your own objects then you'll have to do a bit more work, including creating a few custom textures in a paint package but it shouldn't be beyond the capabilities of most enthusiasts.

DIY aircraft
Plane maker by comparison is a far more comprehensive program providing the tools to create quite complex aircraft, complete with accurate flight models and detailed instrument panels. Because it has this capability it's not particularly simple and you have to know a great deal about aerodynamics and aircraft design before you can build a plane that will actually fly.

ALSO CONSIDER

Software Title:

Fly 2K!

Publisher:

Take 2

Website:

www.take2europe.com

Price:

£ 34.95

PC Pilot Rating:

Software Title:

Flight Simulator 2000

Publisher:

Microsoft

Website:

www.microsoft.com

Price:

Standard £49.99 Professional £69.99

PC Pilot Rating:

You can call up approach plates for most airports

24

PCPILOT Issue 6

Standalone simulator — REVIEW

X-Plane boasts some pretty unique aircraft, including this SR-71

You want objects? They've got objects!

The program itself is not difficult to use and the manual has a commendable stab at introducing the new user to this fairly specialised subject. It's a part of the system that needs a real investment in time before you'll be turning out shiny new aircraft.

However, if you persevere or are already an expert, then Plane Maker covers every facet of aircraft design, from the initial geometry

that makes up the fuselage, to the angle of incidence for each element of the wing. It will also handle variable swept wings, propeller design, vectored thrust VTOL (vertical takeoff and landing) aircraft and has a dedicated section for designing helicopters. In fact we understand that certain small aircraft designers use the package to test conceptual designs for stability, before they're put into production. It has been put to good use in a very novel X-Plane feature, the ability to fly aircraft on Mars. The Martian aircraft use flight models based on the atmosphere and gravity of the red planet, although it's quite hard to test their accuracy in real life!

After a considerable time spent with X-Plane we had very mixed feelings about its performance as a flight simulator. There's no doubt that it's a very comprehensive program but it has all the hallmarks of a product that's not quite finished. The constant updating could be seen as either a good or bad feature, depending on your

You can call up four different types of in-flight maps

Issue 6 PCPILOT

THE WORLD MAKER INTERFACE

The World Maker interface is intended for customising the scenery and is seen here in terrain and obstacle modes.

World Maker obstacle mode

World Maker terrain mode

view. It managed to crash the review PC once or twice and we found it to be quite intolerant of other programs running at the same time. It certainly doesn't like you to Alt+Tab between programs, although to be fair, if you're simply flying from A to B it seems to be relatively stable. Perhaps the review conditions we subjected it to may have caused some of the problems.

Overall, we would suggest that X-Plane is not really for beginners or casual flyers. It doesn't have the same comfortable environment as offered by Flight Simulator 2000 or Fly! However, we have to say that for realistic flight modelling it must be the last word. The recent price drop to around £50.00 (\$79.00) also makes it extremely good value for money. X-Plane is well worth considering if you want something a bit individual that will make a change from jerky views of scenery and landings that often make an expert look like a novice.

Joe Lavery

REVIEW SCORE:

Publisher:

Laminar Research

Website:

www.x-plane.com

Developer:

Austin Meyer

Price:

approx £50.00

Release Date:

Out Now

Pros:

Very much the thinking man's simulator. Very, very flexible.

Cons:

The frequent updates will either delight or annoy.

System Requirements:

PiI 350, 64Mb RAM, 3D graphics card

Recommended:

PiI & PiII 600, 128Mb RAM, 16Mb 3D graphics card

25

No need to wander lonely without a cloud again

FS Clouds 2000

Before Flight Simulator 2000 was launched there was a rumour that Microsoft had spent hundreds of thousands of dollars on their clouds when they saw how fantastic they looked in Fly!. Whether you believe that or not is one matter, but the truth is that while Flight Simulator 2000 is a huge leap forward from its predecessor in the meteorological department, it's still far from perfect. Screenshots show fluffy cumulus and swathes of cirrus clouds convincingly filling the skies, but in flight the effect is less believable with a painted-on look and pixellation up close.

Enter Flight One Software with their Tru-Sky technology. Their latest update to the popular FS Clouds for Flight Simulator 98 is vapourware in the truest sense and

provides a solid improvement to the Flight Simulator 2000 experience.

The premise behind FS Clouds 2000 is simple, as it replaces the default cloud textures with significantly more realistic ones. Six sets in all, three for the 3D vertical clouds that you fly through, and another three for the layers when seen from above or below. These sets vary in wispieness, and can be easily switched using the much improved user interface program.

It sounds simple, but the effect is profound.

The clouds just look real. Gone are the harsh edges around the solid lumps of cumulus and boring banks of mushy overcast. The new clouds disappear into the ether almost imperceptibly, with translucent wispy fringes revealing the



Climbing skywards as dawn breaks over Innsbruck – breathtaking

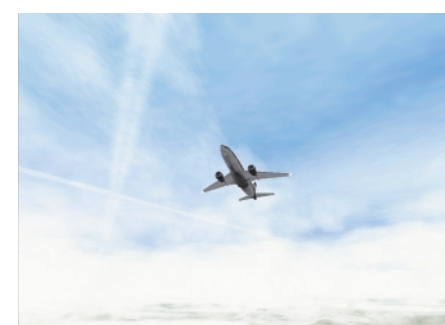
tantalising landscape beneath. Multiple layers with stratus streets, stripy cirrus up top and a special contrail-type that leaves tell-tale evidence of airliners ploughing the upper jet ways, combine beautifully to provide a rich environment to fly in. The new semi-transparent textures mean that you can see what lies above and below,

making the world feel far more three-dimensional than a painted backdrop with a few cardboard cut-outs slapped onto it. Flying at dawn and sunset reveals the most stunning view you're ever likely to see in Flight Simulator 2000. The sunlight filters through the cloud layers in all of its glorious yellows, reds and pinks to provide a literally breathtaking experience.

FS Clouds 2000 not only provides great improvements for those flying under visual flight rules, but there are key additions for instrument flyers too. Low down there is a variant of the stratus cloud type that implements foggy skies to great effect. Dropping down through the misty layer following an ILS (instrument landing system) approach is thrilling. Eerie silhouettes of buildings, dynamic aircraft and even runway lights come into focus as you make last minute adjustments before floating onto the tarmac. New overcast cloud textures make for more convincing skies all around.



Clouds nestle nicely to obscure the mountains, so stay alert



Say goodbye to pixellated patterns, these clouds are nothing but vapour



Not quite perfect, there are some rendering artefacts that can be annoying, but not many

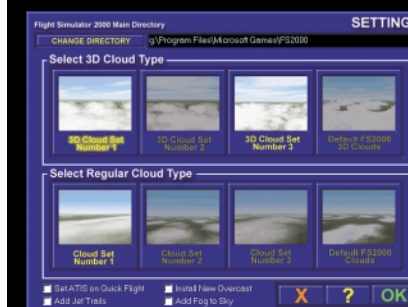
To get the best effect from FS Clouds 2000, a bit of tinkering is required, but using real weather will allow you to slowly explore all of its possibilities with the minimum of fuss. Reading the well-written manual is mandatory and brushing up on the Flight Simulator 2000 Advanced Weather dialogue is recommended too. But for impatient flyers there are five lovely showcase scenarios that include a foggy approach into San Francisco, a beautiful sunset flight and a cross-country tour through a whole variety of weather.

In order to make flight file management easier, FS Clouds 2000 comes with a neat front-end including a Quick Flight facility. Turning off the Flight Simulator 2000 splash screen makes this a great way of managing your flights, as you can dive straight into your aircraft with the minimum of fuss. Pulling up the Quick Flight screen allows you to pick an airport using its name, partial name or ICAO code, select and position your aircraft easily setting airspeed and altitude, change the conditions, and even set up your ILS radio by selecting an approach runway. By placing all of this functionality in one window it is far quicker to be up and flying than ever before.

That's fine for one-off flights, but to build up a library of situations a little more effort is required. FS Clouds 2000 defines scenarios in order to separate out aircraft/airfield and weather information, quite logically consisting of a flight file and a weather file. In fact, these are both standard Flight Simulator 2000 flight files that can be defined as usual. By selecting them independently to form a scenario you can vary weather easily without having to fiddle about in Flight Simulator 2000 itself. Not only that, but custom scenarios can be filed complete with a preview screenshot. These can be slotted in directly, as it can paste from the clipboard. Just hit Print Screen to do a screen grab while flying and paste it into the FS Clouds 2000 scenario editor.

As good as FS Clouds 2000 is, it is not perfect. The benchmark for atmospheric authenticity is still Fly! While the rest of the sim has its foibles, Fly! manages to capture the exhilaration of shooting past wisps of cloud brilliantly. Looking out of the window in FS Clouds 2000 is impressive, but it does seem to amble along at the pace of a hang glider, even when jetting away in Concorde. There are also some rendering artefacts that can be a nasty surprise. Cloud layers that are too close together can start flashing alarmingly and breaking out of cloud layers can be far from smooth, with clear sky bordering on solid white rectangular blocks. Also, while marshmallow-like structures generally nestle nicely among the mountains, overcast layers can form nasty jagged edges around the terrain. Some of these glitches are Flight Simulator 2000's fault rather than the add-on, but they still come as a shock when they rear their ugly heads.

PLAYING GOD



Choose between six new sets of clouds. Doesn't really matter which, they all look fab



Point-and-click setup. Quick flights are a breeze to configure



Putting it all together, weather setups can be saved with flights for easy file management

However, these quibbles are relatively minor compared with what FS Clouds 2000 manages to achieve within the Flight Simulator 2000 framework. The flying environment is enriched spectacularly and best of all with a negligible effect on frame rate. Add to that the neat front-end and flight management system and you have a package that is well worth 25 pounds. ■

Kenji Takeda

REVIEW SCORE:			
Publisher:	Just Flight	Price:	£24.99
Website:	www.justflight.com	Release Date:	
Developer:	Flight One	Out Now	
Pros: Fantastic effects with a minimal frame-rate hit. Nifty front-end for flight file management.		Cons: A few graphic glitches detract and the flying can feel like slow-motion.	
System Requirements: PII 266, 64Mb RAM, DirectX-compatible SVGA video and soundcard			
Recommended: PII 400, 128Mb RAM, 16 Mb 3D accelerator card			

WHICH DO YOU PREFER?



Two screenshots using identical weather setups. Guess which one uses FS Clouds 2000?

Private Pilot

A baker's dozen of general aviation

The new Private Pilot add-on for Flight Simulator 2000 from Abacus contains a whole gamut of light aircraft to complement those that come with the Microsoft original. As well as a box, a manual, quick start guide, fold out map and a CD, what else do you get for your money?

The first 23 pages of the 120 page manual cover the Flight School, which has some interesting and useful information, but won't teach you to fly. There is a short description of each plane followed by 60 pages containing decent checklists. It would have been truly inspired if the checklists had contained engine settings. Genuine pilot's manuals for fuel-injected aircraft would contain details of recommended combinations for throttle, propeller and fuel settings. The quick start guide is really an installation manual, which did its job well because the installation was straightforward and totally trouble free.

Private Pilot will doubtless be bought to fly the fleet of aeroplanes, and there are 13 of them. The smallest is the humble Cessna 152, which is one of the two most common trainers around (the other one is the Piper Tomahawk, which is not in the selection). The Aerostar 700 is at the opposite end of the scale and there is a very good assortment in between. There is even an amphibious 152. One of the advantages of small planes is that they all have different characteristics, requiring different techniques to fly them well. They cover a range of cruise speeds from about 100 knots to around 300 knots. All thirteen planes in this package are sufficiently different to keep the interest levels high.

Having established that the selection of planes is excellent, how do they fly? The first thing to note is that the planes are specifically designed for Flight Simulator 2000 and this is good because their handling is normally far better than those converted from previous versions. The handling and stability of most of the planes is excellent,

with none of the severe adverse yaw or unusual characteristics that can spoil many add-on planes. The Aerostar 700 is less well behaved in pitch than the others, but this is more than compensated for by the Cessna 310, which is an absolute dream to fly. Several planes require a touch of rudder on the turns, which will keep you on your toes and help you learn the basics of the pedals. The flaps add a good degree of lift and while this feels a fraction exaggerated, it does mean that you can see the runway of final approach, without needing the customary (and annoying) Shift+Enter routine.

The normal view out of the windscreen includes more of the pillars than the standard Flight Simulator 2000 layout. It gives a significantly enhanced degree of realism with only a small reduction in the instrument size. On the other hand, the view out of the side windows is mixed. Sometimes good but sometimes muddled, with the view of your plane partly missing or a blur, and the twin's propeller seemingly inside the cockpit with you. The external views were up to the normal Flight Simulator 2000 standards.

The instruments are clear enough to fly accurately and move smoothly. It is far better than some add-on planes where half of the panel is for decoration, rather than a proper simulation. The instruments respond well and the degree of wander when you don't concentrate properly feels relatively realistic. It is impossible to identify the beacons on some of the radio stacks, which is a key element of instrument flying. If you didn't identify a beacon in a flight test, you would get a big black mark from the examiner. The selector boxes at the top of some of the radio stacks are attractive representations of the real thing, it's a shame that they don't work.

The frame rate is about the same as the standard Flight Simulator 2000 planes, so if you have set your scenery to give you a



Pilatus PC-12 over the Forth Bridge

reasonable frame rate, you should not find this any different.

The software includes a fictitious Island Airpark, which is a small island with several different runways, including an 800 metre one with 50-foot barriers at each end to hone your short field technique. There is also an obstacle course to test your handling in tight situations and provide a tad of entertainment.

There are a number of freebies and demos included with the package, which we found useful. Pilot Tools is a small utility that calculates headings corrected for wind and does a few unit conversion calculations. The checklists for the planes are included in various document formats, and seem to be the same as in the manual. There is a Virtual E6B that performs a multitude of useful aviation calculations. The Morse Tutor (shareware) is enabled sufficiently to give you a basic knowledge of Morse code. There are flight log sheets and a demo for US and World Simples

The majority of pilots in the world are probably flying GA (general aviation) planes and variations in performance and handling between the types can be enormous. This is an excellent product for anyone looking for a package that gives a good simulation of the GA planes flown by pilots from their first flights through to early commercial air taxi work. ■

Stephen Heyworth

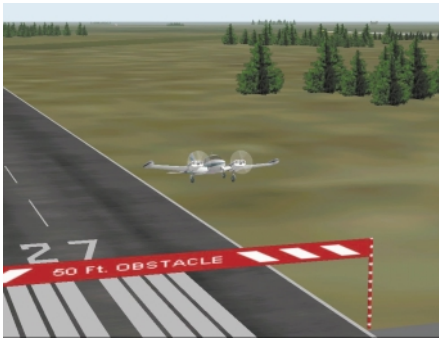
WHAT'S IN THE BOX, MISTER?

Aerostar 700
Beechcraft / Raytheon Baron 58
Beechcraft Bonanza V-35
Cessna 152
Cessna 152 Floatplane
Cessna 172SP Skyhawk
Cessna 310 N
Diamond Katana DA20 C1
Stoddard-Hamilton Glasair III
Mooney M20R Ovation
Pilatus PC-12
Piper Malibu
Piper Saratoga II

REVIEW SCORE: 		
Publisher:	Abacus	Price: £29.99
Website:	www.abacuspub.com	Release Date:
Developer:	Tim Dickens & Terry Hill	Out Now
Pros:	Good and varied selection of GA planes. Realistic and relatively stable handling. The style used for the front windscreen view enhances realism.	
Cons:	Muddled side views graphics. Radio stacks not fully functioning. No engine setting data.	
System Requirements:	PII 200, 32 Mb RAM, 3D graphics card	
Recommended:	PIII 500, 128Mb RAM, 32Mb 3D graphics card	



Normal view inside the cockpit of the Cessna 310 with the 50-foot barrier to clear



Cessna 310 passing over the 50-foot obstacle on Island Airpark

FLY! Airliner Series 757-200

Another Boeing beauty

Yet another airliner add-on for Fly! is this rendition of the Boeing 757-200 from Precision Manuals. As you might expect from the company name, it comes with a weighty tome to give you the low-down on every aspect of flight operations. However, the weight is virtual and like Wilco's 737 add-on, this is a download only product at the moment. At 16 megabytes it's a little bit quicker to pull down, but you'll still be hogging the phone for a long while. Add to this the cost of printing out the superb 116-page PDF manual, and you're talking quite a bit more than twenty quid.

Installation simply involves copying one big file into your Fly! directory, so you can concentrate your time mulling over the multitude of checklists in preparation for your maiden flight.

There are four liveries included in this pack: Condor, TWA, United Airlines and US Airways, all looking rather sharp. The animated slats, flaps, gear and even speed brakes look fantastic. The only significant flaw is lack of transparent cockpits, but this is a minor infraction. Inside the cockpit there is a detailed panel that is zoomed slightly further out than the Wilco 737 display. This means that you can actually see out of the windscreen and maintain your primary flight displays in full view. The overhead panel, throttle quadrant and centre pedestal all look pristine, but not as utterly photo-realistic as Wilco's.

Firing up the engines in this beast reveals the subtle DAT recorded sounds that

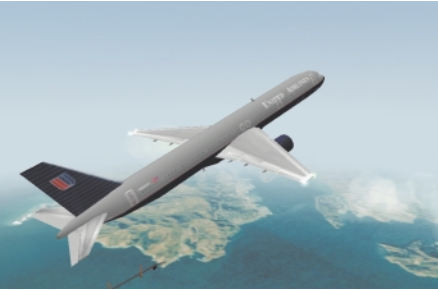
add tremendous atmosphere to the environment. The high-pitched whines and roars certainly sound as authentic as they claim to be. Hurling down the runway is exhilarating in this aircraft, which has plenty of acceleration to propel itself into the air. Once airborne it feels graceful, but must be flown with the respect deserved of such a large airliner. Unlike the more modest 737, this is capable of real long haul, ETOPS (extended-range operations) flights that will tax the most experienced of pilots.

To get the most out of this add-on you really have to read the manual and appreciate the responsibilities of an airliner captain. Joy riders need not apply here, as flying by the book is what's important. Luckily the book details all major procedures, flight conditions and systems handling. It's not quite up to the utter realism of Aerowinx PS1, but it really isn't that far off for the most part. Indeed, Precision Manuals sell a flight ops book for PS1 744, and the one included with this add-on is of the same high standard.

If you're itching to take charge of a big airliner using Fly! as your baseline simulator then PM's 757-200 is an excellent choice. For those who want a bit more agility, then the smaller 737 from Wilco may be a better bet. One thing's for sure, both of these add-ons provide good value and a memorable flying experience for those graduating to the airline big leagues.

Precision Manuals are set to release a new version of 757-200 shortly with even more refinements. We look forward to it! ■

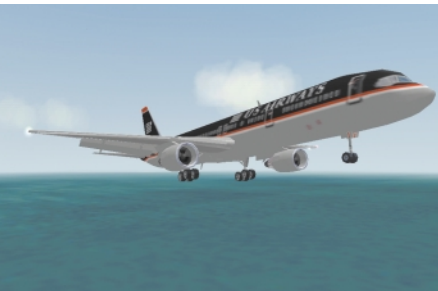
Kenji Takeda



The slender body of the 757 is a graceful sight



Away we go, but be prepared for a rejected or aborted takeoff



Extra high-lift devices make for smooth low-speed handling



External detailing is exemplary, even the speed brakes deploy convincingly



The cockpit panel looks great and functions well without obscuring the view too much. 757 pilots will find themselves right at home, the rest of us had better read the manual

REVIEW SCORE: 		
Publisher:	Precision Manuals	Price: £16.00 via download
Website:	www.precisionmanuals.com	Release Date:
Developer:	Precision Manuals	Out Now
Pros:	Excellent systems and flight dynamics, with a truly comprehensive flight manual. Better zoomed out panel view than Wilco's 737.	
Cons:	Big manual to print, fiddly aircraft load out set-up and no transparent cockpits.	
System Requirements:	Pentium 200, 32Mb RAM	
Recommended:	PIII 450, 128Mb RAM, 32Mb graphics card	

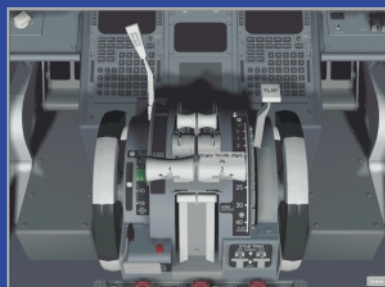
LOVELY DASH



We wish our offices were as spacious as the 737-500



A shiny new panel with all mod cons



Did we say authentic? It doesn't get any better than this



Only touch the red ones if you know what you're doing



All present and correct. The flight computers are fully specified

737 for Fly!



No rotating turbine blades, but the pilots are there in the cockpit

That 'other' flight sim gets an add-on

In the budget-conscious, penny-pinching world of computer games, flight simulation is at risk of becoming an endangered species. The recent shutting down of Looking Glass Studios means that the only serious competition to Microsoft Flight Simulator 2000 is Fly!. Touted as being the most realistic PC flight simulator ever, it was launched in a plethora of publicity but with a full basket of bugs. Still, its open-architecture and solid foundations means that it has gained a loyal following – find out more about it in our Fly!2K section at the end of this review.

Wilco Publishing is one of the first large commercial add-on companies to release a Fly! add-on product, and it is doing so tentatively by making this 737-500 for Fly! available only over the Internet as a download. Expect to spend a good while

downloading the 20-plus megabyte package, including PDF manuals.

One major feature of Fly! is the scrollable panel display. Allowing you to literally look around the instruments means that the entire front office can be represented – every single switch, sign and warning light. Loading up Wilco's 737-500 demonstrates the amazing level of detail that is achievable with this approach.

In the main front panel display you can scroll from the pilot's seat across to the co-pilot's seat and operate every switch interactively using the mouse. Pressing CTRL-arrow jumps to the overhead panel, the throttle quadrant and (fully functioning) flight management computer. Every panel is reproduced meticulously and together with the side-views, look stunningly photo-realistic.



Control surface and landing gear detailing is impressively solid

The downside is that you really must run at 1024x768 resolution or above to make use of the primary flight instruments and still be able to see over the dashboard.

The view from outside is somewhat subjective depending whether you're a regular Fly! or Flight Simulator 2000 pilot. The graphics engine in the former lacks much of the sharpness of Microsoft's behemoth. So, while the 14 different Boeings provided look good, they lack some of the sparkle of their Flight Simulator 2000 counterparts. Of course, beauty is only skin deep, so if you can forgive the lack of

rotating turbine blades you will be rewarded by a convincing ride.

Fly! is streets ahead of Flight Simulator 2000 in its flight modelling and the airliner here shows that off well. Taxiing on the ground must be done properly or you'll overstress the oleo struts on the undercarriage and give your passenger's a bumpy ride. Running through the comprehensive pre-take off and take off checklists provides a good opportunity to listen to the wonderful creaks and groans of the aircraft as it gets ready for flight. Overall, the sounds are first-class and add an extra dimension to the experience.

Rolling down the runway and climbing away belies the manoeuvrable nature of this baby Boeing. Compared with the default Flight Simulator 2000 737, this somehow feels more natural and fluid in its movement and is a joy to fly.

Wilco has done a thorough job with their first Fly! add-on, and those looking

for a regional airliner to pilot will do well here. We can only hope that they continue to produce such quality support for Fly! and keep the community fired up.

Kenji Takeda



Blurred aircraft textures are a disappointment, a reflection on Fly!'s graphics rather than the add-on

REVIEW SCORE: 			
Publisher:	Wilco	Price:	£18.95 via download
Website:	www.wilcopub.com	Release Date:	
Developer:	Wilco	Out Now:	
Pros: Meticulous recreation of the 737-500 cockpit with good flight dynamics and documentation too.		Cons: Blurry external textures and you only get the one aeroplane, albeit in many different colours.	
System Requirements: PII 200, 32Mb RAM, 3D graphics card		Recommended: PIII 450, 128MB, 32MB graphics card	

FLY!2K — THE DOWNLOAD NIGHTMARE COMES TO AN END

Microsoft may have stolen the mainstream market with Flight Simulator 2000 last year, but Gathering of Developers wasn't having any of it. GOD, or more specifically their Terminal Reality studio, were ready and waiting with the most hyped flight sim of all time. Fly! pre-empted Flight Simulator 2000 and undoubtedly made Bill Gates' boys sit up and take notice.

It does three things exceptionally well. Aircraft instrument panels were rendered in intricate detail and are fully interactive. The whole dashboard is scrollable, so you can access every single switch, knob and dial. This isn't just for show, Fly! reproduces aircraft procedures to the letter.

Up in the air is where Fly! shines through, with excellent flight modelling and stunning clouds. Never before had a PC flight simulation managed to recreate the true sensation of slicing through mountains of water vapour.

Unfortunately, the underlying graphics engine looked at least a generation behind Flight Simulator 2000 and Flight Unlimited III and the product shipped with a huge number of bugs and patches were released on an almost daily basis to fix them at one point.

So, to revive interest, Terminal Reality are re-launching their flagship sim as Fly!2K, patched to the hilt and with a few new additions. The bug fixes are certainly welcome and make add-ons like the ones reviewed here install in a snap. The other tweaks included are Sky! that provides extra cloud sets, InfoMetar for real world weather downloads and Roger Wilco to improve multiplayer capability. There's also a nice IFR instrument panel for the Cessna 172. Existing owners can upgrade to Fly!2K for the cost of a (big) download, so you can stay at the cutting edge without shelling out full price for these niceties.

For pilots more concerned with aircraft fidelity, instrument flying and procedures than pretty scenery, the world of Fly!2K has much to offer. However, it has little for casual flyers ahead of Flight Simulator 2000, and that's probably why Take 2 are reserving judgement on a UK release. In the meantime, if you like the look of the Wilco and Precision Manuals airliners reviewed here, then RC Simulations (www.rcsimulations.com) are importing some copies of Fly!2K directly from the US.

REVIEW SCORE: 			
Publisher:	Take 2 Interactive	Price:	£34.95
Website:	www.iflytri.com	From RC Simulations or free (allegedly) for registered Fly! owners check www.iflytri.com	
Developer:	Terminal Reality		

TRANSPILOT SHOP

Flight Sim 2000



FS 2000 includes new building textures, new advanced 3D building models, and a true elevation model of terrain. It also features an integrated flight planner with real Jeppesen navaid data, an updated weather system with advanced weather dialogue and the addition of new cloud textures and weather effects. Microsoft has updated the existing aircraft library by creating new textures for all its planes, both inside and out, also Concorde and Boeing 777 are added to the library.

4430B	MS Flight Sim 2000	£39.00
2001B	MS Flight Sim 2000 Pro	£56.00

Fly - Flight Simulator



4707D	Fly - Flight Simulator	£39.95
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Airline Simulator 2



Relying on real-time flight dynamics with impressive flight models and true to life cockpits for the MD-88 and the Boeing 747-400. Also includes B737, B767, B747-357, A320 and Shorts 360 aircraft. World-wide scenery database including Navoids and beacons, over 1600 airports in Europe alone, and modelled in true 3D depth. Weather effects such as high wind and turbulence simulation, rain and snow effects you can also change runway conditions. All aircraft have FMS, LNAV, VNAV and CATIII auto land.

7609D	Airline Simulator 2	£99.99
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Combat Flight Simulator



4566D	Combat Flight Sim	£39.99
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The most realistic combat simulation ever to take flight. Microsoft have incorporated accurate flight characteristics for each aircraft, with aircraft including: The Hawker Hurricane, Spitfire, FW 190, BF 109, P47D Thunderbolt and the P51D Mustang. Fly through realistic war-torn landscapes of London, Paris and Berlin. Fly against computer controlled aircraft such as: JU87 Stuka, Heinkel 111, Junkers JU88 and Boeing B-17G, or wage war against human opponents via modem and the internet.

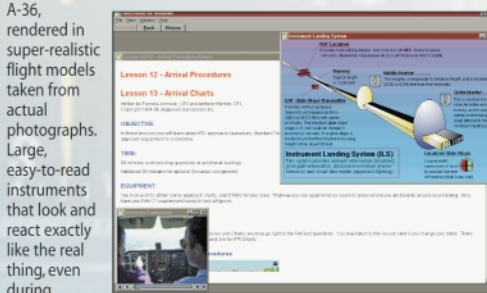
Jeppesen FlitePro



IFR Flight Simulation For Serious Pilots



Flite Pro features; a Moving Map GPS, flight replay over Jeppesen approach plates, enhanced worldwide navigational map screens. The software provides screen panels for both the Cessna 172 & Bonanza A-36, rendered in super-realistic flight models taken from actual photographs. Large, easy-to-read instruments that look and react exactly like the real thing, even during simulated failures. Includes a world wide Jeppesen Nav-data base, Victor and Jet airways, Airspace and Terrain depiction, City outlines, Bodies of water, Major roads and railways, airport information, Navaid locations and frequencies, Restricted airspace, Country and state borders and User defined waypoints. There is also a new route building feature which allows you to plan your simulated flight and up-load it to the GPS.



2069D	Jeppesen FlitePro Software	£79.95
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CH Flight Sim Yoke



4772D	CH Yoke (USB Connection)	£99.99
5153D	CH Yoke (Standard Connection)	£99.99

This new generation Flight Sim Yoke is a truly realistic, professional flight yoke designed for computer pilots to add that extra look and feel of super realism to your simulations. Unparalleled flying experience will be enjoyed for the lifetime of your computer.

Pro Pedals



8027D	Pro Pedals (Game Port)	£95.00
4662D	Pro Pedals (USB)	£95.00

The Pro Pedals are high quality, durable, precise, and realistic foot pedals for use with flight simulation games. These pedals are built with precision mechanics, rated to 2,000,000 cycles, to withstand the toughest of manoeuvres that can be thrown at them. Get ready for a more realistic flight with the Pro Pedals. Available with Game Port or USB connections.

Flight Stick Pro



8025D	Flight Stick Pro	£59.95
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Flight Stick Pro takes you into combat with the edge that lets you finish first! You can activate radar, arm and disarm weapons and view about your aircraft without ever having to remove your hand from the stick. Microsoft Flight Sim pilots can operate all cockpit views, brakes, flaps and undercarriage.

ProFlight 2000



Proflight 2000 is an instrument procedural flight simulator for Windows. It is an essential personal training aid for pilots training for or maintaining the Instrument Rating or UK IMC Rating, and for PPL's who wish to gain a general understanding of radio navigation as an aid to VFR flight. The software includes photo-realistic Piper and Cessna instrument panels. Includes Instrument Flight for the UK and the main areas of western Europe, including Stockholm, Athens, Lisbon and Berlin. Extra map-data bases can be added on-line.

8580D	ProFlight 2000	£125.00
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Order line: 01273 466000

www.transair.co.uk

Jeppesen SIMCharts



Enhance your flight sim with these CD ROMs contain Jeppesens IFR approach charts in detail. These CD's will give you fast access to approach plates, airport diagrams, Standard Instrument Departures and more. Jeppesens SIMCharts cover twelve regional areas.

8122D	SIMCharts 'Europe'	£15.95
4457D	SIMCharts 'Eastern Europe'	£15.95
8131D	SIMCharts 'Pacific'	£15.95
4461D	SIMCharts 'Middle East/Asia'	£15.95

more areas available...Call for details.

744 Precision Simulator



The PRECISION SIMULATOR has been developed in cooperation with 747-400 experts from all over the world. The user base ranges from leading airlines, NASA research centres, universities, to pilots of all categories who use PS1 during their transition training to "glass" or, regularly, at home, as a refresher. Also students who want to be prepared for airline interviews and sim checks, instructors who "test-fly" new scenarios on the PC before going into the full-flight sims, maintenance specialists, Human Factors labs, avionics designers, flight dispatchers, ATCs and many other aviation professionals rank among PS1's user base since its introduction in 1997. Whether you're practicing IFR procedures using the FMC and EFIS tools, or playing "what if" in the hydraulics, electrical, pneumatics etc.: all systems simulations are permanently interacting with each other and may develop enormously complex situations!

4555C	744 Precision Simulator	£179.95
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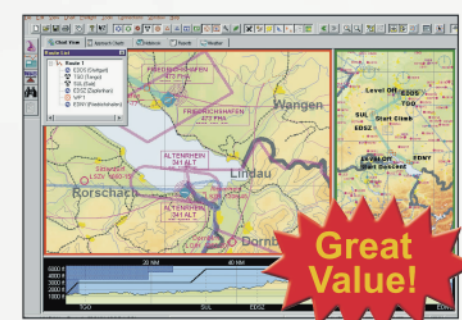
Private Pilot



Private Pilot allows you to fly the best of light singles and twins, including the C-150, C152, C172, C310, Katana, Mooney Ovation, Pilatus PC-12, Piper Malibu, Aerostar 700, Beech V-35, and the Beech Baron 58. Other essentials for flying include individual checklist cards for each aircraft, a guide to basic type manoeuvres and acronyms, Chicago area sectional map, FAA pilot knowledge test sampler, tools for determining weight and balance, density altitudes, pressure patterns and E6B calculator.

4916D	Private Pilot	£29.99
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Jeppesen VFR FliteStar



This low cost, but feature-rich product is the perfect solution for VFR pilot's flight planning needs! Take your flight planning to the next level!

FliteStar VFR includes point-and-click as well as automatic routing. You can route between VOR's NDB's airports, and user-defined waypoints as well as via direct and great circle paths. You can even route around special airspace. Features include: Colour coded elevation information can be viewed in both the planview and profile views.

Plan your flight with terrain avoidance option. Print reports including a navigation log, FAA or ICAO flight plan, and a cst report. Automatically figures your aircraft's weight and balance and CG location. Use one of the aircraft models included with FliteStar VFR or build your own. Fully compatible with Jeppesen digital RasterPlus VFR and nautical charts.

8106N	VFR FliteStar - Europe	£85.00
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Hand Glider Simulator



Featuring gorgeous graphics, 12 different aircraft including sailplanes, paragliders, microlights and hang gliders. Each aircraft flight model has been designed especially to simulate low speed flight. Hear dynamic wind sounds simulation the thrill of flight. Five photo-realistic 3D scenarios especially developed to show low altitude flight, real-weather effects (Wind management for thermals, ridge effects & cloud suck!) Training flights, different skill levels and competition flights. A truly unique programme.

6466D	Hang Glider Simulator	£34.99
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RAF 2000

The latest edition has new aircraft, authentic WWII scenery and compatibility and enhancements for Combat Simulator. RAF 2000 also features 20 new aircraft with moving parts (animated Gear, etc) including: Hawker, Nimrod, Chinook, VC-10, Mosquito, Lysander, Beaufighter, Wellington, Typhoon, Spitfire, Halifax, Hawker Hart, Tiger Moth, Avro Tutor, Hawker Fury, Jet Provost, Lightning, Javelin, Shackleton, and the Hawker Hunter. New Scenery includes WWII airfields in the UK, adventures and combat missions.

7611D	RAF 2000 FS2000 Add-on	£24.99
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FS Clouds

The essential weather planner for MS 2000. New clouds have been modelled to act more like true vaporous clouds. FS clouds 2000 also includes versions of FS clouds for FS98, FS95 and FS 5.1. Other features include a new 'quick flight' feature for building approaches to any airport with a few mouse clicks. Set-up flights and navaid view and create scenarios for uploading to the internet.

4597D	FS Clouds	£29.99
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A Collective Effort

PC Pilot gets a close look at the new Defence Helicopter Flying School where they're busy using and abusing Flight Simulator 2000 to help with training

One school for three services

Ever wondered how and where most of Britain's helicopter pilots learned their trade? Well, because of the huge cost involved with flying choppers, the vast majority are either serving or ex-military pilots. For many years the three UK Services have had their own independent helicopter forces and trained their own crews from scratch, deploying them into the many different roles required by each force. During the Defence Review of 1994 it was realised that the basic skills were the same and it therefore made good sense to combine the three separate basic rotary flying training schools.

The Royal Navy moved its helicopter training out of RNAS Cudrose, the Army Air Corps wound up its basic training at Middle Wallop and in April 1997 the DHFS (Defence Helicopter Flying School) was created at RAF Shawbury in Shropshire, previously the home of RAF rotary training. The school, one of the largest in the world, was initially commanded by an Army Colonel and the current boss is a Royal Navy Captain. When the school was set up, a large element of private sector involvement was introduced with a contractor supplying all the aircraft, all the engineering and 40% of the flying instructors who are all ex-military QHI's (qualified helicopter instructors). The contract is currently operated by F.R.A. Services.

Students of all three services come through on courses together, after elementary flying training on fixed wing at Barkston Heath. Following three weeks in ground school learning the basics of helicopter aerodynamics, aircraft tech, meteorology and lots of general

'airmanship', they start flying on the Squirrel with 660 Squadron. This is a long established Army Air Corps unit, and is commanded by an Army Major. Here they learn the basics of rotary general handling such as hovering, circuits, limited power handling, forced landings and engine-off landings. This phase lasts eight weeks and includes about 36 flying hours.

The students then move across to 705 Squadron, previously the Navy's helicopter training Squadron at Cudrose. 705 is commanded by a Royal Navy Lieutenant Commander, but as on 660, the staff are from all three services plus civilians. This is where the advanced training is flown on the Squirrel in 45 hours over 11 weeks. The first phase here is a 9 hour instrument flying package, followed by confined areas (approaches to small clearings in woods etc.), navigation (flown down to 100 feet), night flying and for the Navy, close formation and winching as well.

The Navy and Army Air Corps students then head back to their respective services to do further advanced training and conversions before moving on to operational flying. Meanwhile, the RAF students stay at DHFS to fly a multi-engine course on the Bell 412 Griffin with 60 Squadron (RAF). After more ground school and a type conversion, they cover underslung loads, NVG (low flying at night with night vision goggles), procedural instrument flying, formation and tactical flying, search and rescue training and mountain flying. This course takes 25 weeks, including about 66 hours flying the real aircraft and about the same again on the full simulator (more of which anon).

THE DHFS FLEET

26 x AS350BB SQUIRREL

The Squirrel is a single engined, light training helicopter, manufactured by Eurocopter at Marignane in France. It is the Ministry of Defence's successor to the Gazelle as a basic rotary trainer and is powered by the Arriel 1D1 gas turbine engine which drives a conventional 3 bladed main rotor and twin bladed tail rotor. It has proved to be extremely reliable, despite some fairly rough handling from students and frequent engine-off landings. This, combined with the efforts of the engineers produces on average 24 - 25 aircraft ready for action at the start of each flying day.

Top speed:	156 Kts
Cruise speed:	120 Kts
Endurance:	3 Hours
Ceiling:	10,000 feet
AUM	4,620 lbs
(all up mass):	
Passengers:	4
Crew:	1 or 2 Pilots

6 x BELL 412 EP GRIFFIN

The Griffin HT1 is the UK military version of the Bell 412 from Bell/ Textron Inc. It is powered by two Pratt & Whitney PT6T-3D turboshaft engines, rated at 1800 shaft horsepower, driving a four bladed main rotor. It has replaced the venerable Wessex as the RAF's multi engine advanced rotary trainer.

Top speed:	140 Kts
Cruise speed:	120 Kts
Endurance:	2 Hrs 45 Mins
Ceiling:	10,000 feet
AUM	
(all up mass):	11,900 lbs
Passengers:	10
Min Crew:	1 pilot



A pupil in night vision goggles is either ready for a night flight or about to read the small print on a box of software



Bell 412 EP Griffin comes down to earth



AS350BB Squirrels at rest

Flight simulators of every size

Squirrel CPT (Cockpit Procedures Trainer)

660 Squadron has two professionally produced 'non flying' CPTs, which are a strange mix of real and unreal! The cockpit, its furnishings and controls are the genuine article, however, apart from the engine instruments the panel is a large photograph. Although this sounds makeshift, it does do the job it was designed for which is to aid pupils in learning checks, starting the thing and practising emergency drills. From a console outside, numerous emergencies and starting problems can be simulated.



Pupils hard at work in the static cockpit procedures trainers

Full motion Griffin simulator

This multi million pound beast is truly awesome. Housed in a purpose-designed building it cavorts on massive jacks to

create sensations that are 'as real as it gets' (where have we heard that before?). It is so close to the truth that students can fly low level, dive into a confined area, fly procedural airways or even night NVG, and hardly notice the difference from the real thing.

As well as the full motion Griffin there is also a full static simulator. The main simulator was not ready in time for the first students coming through the school, so F.R.A. bought this unit to fill the gap. Once the full sim was running it was kept on as a CPT, but a certain amount of procedural instrument flying is also flown on it. It has a fully working and realistic cockpit and the outside visuals are projected onto a large screen by a light projector. It is an excellent trainer but students tend to get airsick after a while.

Squirrel instrument flying trainer – The Witch

The need for a Squirrel Simulator was not foreseen and therefore never provided. However, during the Instrument Flying phase on 705 Squadron it soon became apparent that a lot of flying hours were being eaten up in training pupils to develop a good instrument scan (the rapid and prioritised scanning of the flight instruments to maintain accurate flight). If this time could be supplemented with extra practice on a simulator, then the final standard would be higher and failures minimised. At about the same time a couple of staff members were messing with Flight Simulator 98 and saw the exciting possibilities. They set to work, although at



No, not the shuttle deck of the Starship Enterprise, but the full motion Griffin simulator in its hangar

this stage without any clear idea of the end-product. Andy Digby, an ex-RAF QHI on 705 Squadron takes up the story:

None of us had any real idea of what we were getting into, what the possibilities were or how to do it, but one of our Navy instructors, Simon Sparkes, started the ball rolling by sorting out a Squirrel instrument panel. This was very basic with a generic panel background, but at least the instruments were in the right places. Most of the instruments were 'borrowed', although several, like the Radar Altimeter, had to be downloaded from the net. We had a set of CH controls – joystick, throttle and pedals, but sitting at a desk with these was hardly realistic.

Simon then departed to do a Test Pilot's course and I was left to do what I could with our simulator. Firstly, I liberated a 34-inch monitor that was surplus to requirements since most units have switched to light projectors for presentations. This made the instrument panel roughly full size. I then set about converting an office chair, mounting the joystick on a plate projecting forwards with the joystick in just the right position between the knees. The left armrest bracket was used to mount a plate on which the collective lever (a bit of broom handle, hence the name the Witch) pivoted and a model aircraft control linkage joined its operating arm to the CH throttle. The seat has to be very low to achieve the correct ergonomics and this caused the pedals to keep slipping, so I screwed carpet grippers to the bottom. Sorted! I also removed the springs from the pedals and put a large bolt through the centre to get the right feel.

Putting all the pieces together meant building some sort of cubicle to house it. The huge monitor sits at just the correct height and distance in relation to the seat/pilot's eyes and the whole is enclosed by curtains. So now we had a pretty fair Simulator, but how best to use it with the students? We could obviously set the cloudbase low to be flying IMC (instrument meteorological conditions), but peering over the curtains to give instructions was not on. What we needed

was an outside controlling station and an intercom. The big monitor has an output socket for a repeater, so setting up the control station with a second normal size monitor was simple. The intercom was a bit more tricky. We looked around for a commercially available set-up but they were either unsuitable or too expensive for what was still an unfunded project.

Fortunately at Shawbury we have experts in almost every field, so a few weeks later we had our intercom courtesy of the ATC School simulator engineers. We just told them what was needed and they fished around in their box of spare bits, waved a soldering iron around and hey presto we got an intercom complete with a couple of lightweight headsets. Both the computer sounds and intercom speech play through it and the student's microphone is wired through the joystick trigger to add to the realism of making radio calls.

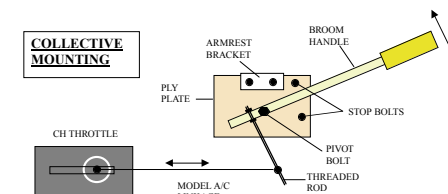
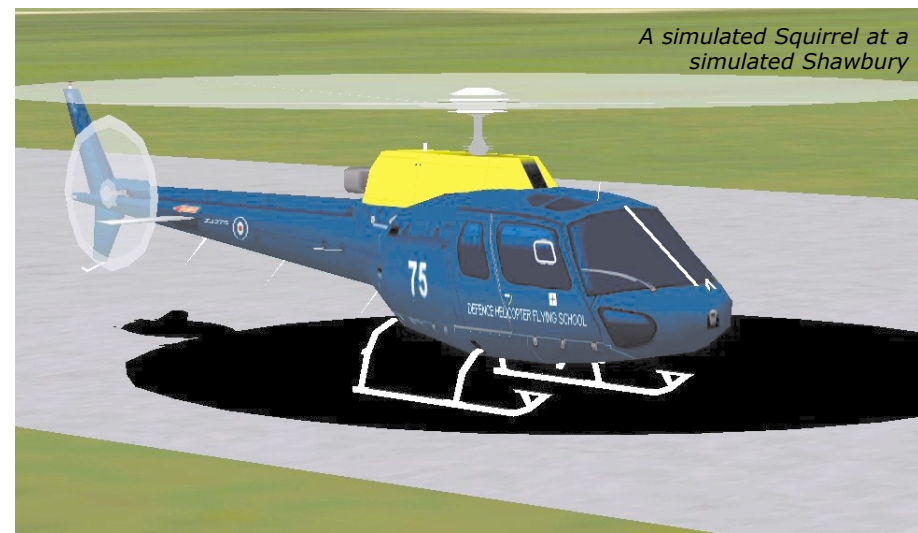


Diagram showing the collective mounting developed by the DHFS

In this condition the Witch entered service as an optional training aid. Some students found it very helpful, some not so, but significantly those who were struggling in the air and spent time with the Witch invariably improved. The biggest complaint was about the poor flight dynamics and we tried a few other versions of the Flight Simulator AIR file but never really sorted it out. Meanwhile, we got into the area of gauge customisation, as a lot of them were wrong for the Squirrel. The Rotor RPM was shown in % rather than numerically, the fuel was in gallons not Kgs, the coloured limitation marks were all in the wrong places and so on. Changing these was fairly straight forward but time consuming.



The well designed custom controls of the Witch

Military helicopters always have a standby AI (attitude indicator) and we practice flying on just the standby, so we designed a suitable patch to cover the main AI. We utilised the standby compass window and its selector button, deleted the instrument and just brought up its background (slightly modified), positioned smack over the main AI and it works a treat.

Recorded instructions

We sometimes found students flying on their own without the discipline of instructions, so the next modification was to incorporate a tape recording of instructions to fly to. We scripted a 30 minute sortie which was carefully choreographed and timed and then had a recording session with a couple of other pilots and an Air Traffic Controller. The finished article played through the intercom and included all the basic IF (instrument flying) manoeuvres, lots of radio calls and finished with a radar talkdown. Of course, as it wasn't linked to Flight Simulator 98 in any way, this ended up in the middle of nowhere, so the students flew a 'missed approach procedure' (go around).

Updating the Witch to Flight Simulator 2000

Then came the rumours of Flight Simulator 2000 and we were first in the queue. First impression was "fabulous, but

About Andy Digby

Andy Digby served in the RAF for 27 years, starting as a rigger (airframe mechanic) on the Beverley, then as an Airloadmaster on Britannias and Wessex. He was commissioned as a pilot in the early 70s with training on the Chipmunk, Jet Provost and Whirlwind and went on to fly the Puma, Wessex and Sea-King operationally before becoming a QHI (qualified helicopter flying instructor). He instructed new rotary pilots on the Gazelle before his final tour at the CFS (Central Flying School), training new instructors. A couple of years after leaving the RAF he rejoined the fold as one of the civilian instructors on DHFS, where he flies the Squirrel on 705 Squadron. He's still only 23 but dyes his hair a distinguished silver colour (or so he tells us!).



The Witch and her master, QHI Andy Digby

Andy's first experience of flight sims was eighteen months ago when 705 Squadron started development of Flight Simulator 98 for training and his only programming experience was messing with a Sinclair ZX81 some time in the last century!



Andy Digby lowers a Squirrel into a nearby garden to take tea with the (usually) friendly Shropshire lads and lasses



The latest panel for the Witch showing the new attitude indicator

we need a new computer to run it". The frame rates were down to about 3-5 fps so we persuaded the boss to order a decent computer. Of course, we had to completely redesign the Squirrel and this time we did the job properly, starting with a digital photo of the real thing and then spent the Christmas holidays putting it all together.

We found the Flight Simulator 2000 aircraft editor very unreliable with instruments leaping off to very strange positions, so we resorted to doing it longhand in the panel 'config' file. The finished article was pretty impressive, even though we say so ourselves. We were able to run it for the students using the old computer by closing the scenery window (it was IMC after all) and this gave workable frame rates but denied us the beautiful weather effects and a runway to fly from/to. Cockpit graphics were much improved over Flight Simulator 98 and the flight dynamics were also much better.

Accelerate to RAMming speed, Mr. Digby

Also about this time we started looking for better flying controls and ordered a set of COPY-CAT controls from RC Simulations. They arrived at the same time as the new computer, a Pentium III 500 with 256Mb RAM and a Matrox G400 card. So we took the Witch off line for a week to get the new set-up installed. The controls are a big step forward, with the full height cyclic

giving good feel and the bar pedals are excellent. Our only disappointment is the lack of any trimming facility, especially as the helo model in FS2000 doesn't have any trim. (If anyone out there knows how to trim the helo model, please let me know). We kept the witches broomhandle collective as it was fine as it was. The new computer was giving excellent frame rates of about 30fps on the Meigs Field benchmark check, and enabled us to fly with full graphics.

The Witch goes interactive

We had never even looked at 'adventures' because we imagined they would not be relevant to our project. However, as soon as we saw what they were about we realised that our tape recording of instructions and Flight Simulator 2000 could be brought together interactively. Those nice people at Just Flight pointed us towards Adventure IDE, an adventure composer from Simsystems.com.au and with a lot of help from a computer whizz student, Dave Sutton, several recording sessions and editing for voice files, lots of trial and error and hair-tearing, the Witch became interactive. What's it all about? Well, basically it plays a wave file of an instruction, eg "Turn right onto 270°", and when that instruction has been completed it triggers the next instruction. It also monitors accuracy and calls up Mr. Grumpy, the instructor, to tell you to get in balance. In this way we have sequenced an entire sortie, including an ATC talkdown to the runway and Mr Grumpy giving the sortie a grading at the end. Impressive or what?

So that's where we are at with our little simulator. We have some minor titivation to do on the interactive side (that's a lie, it's quite a bit actually), but apart from that it is difficult to see where the next step forward will be (but we thought that 12 months ago). In years to come, when you hear a helicopter droning overhead in cloud, chances are the pilot learned how to do it on Andy Digby's Flight Simulator 2000 machine at DHFS.

Andy Digby

So how does it compare to the real thing?

When the DHFS offered PC Pilot a chance to come and appraise the Witch in action and then compare it with a real Squirrel, some serious rank-pulling went on. The matter went to arbitration and it was decided that our chief investigator should be the one with the most experience of helicopters. As it turned out, our chosen one had actually worked on Squirrels and so he had more than a passing knowledge of these beasts.

It is fair to say of the Witch that there are probably far more sophisticated amateur cockpits around, with everything from real instruments to custom sounds. The DHFS also own a state of the art full motion simulator, so why bother with a Flight Simulator 2000 set up? The answer is in the amount of use made of this device by the DHFS pupils. The Witch costs very little to run, especially when compared with her more active stable mates and pupils can use it at any time to brush up on their instrument scan techniques. Although it isn't an official element of the course at Shawbury, the pupils would certainly miss it if it were no longer available.

As for the real Squirrel - all we can say is that our comprehensive lesson in control familiarisation, turns and hovering in the Squirrel left us desperate for more. The two most important lessons we learned were that there is no feedback from a helicopter stick and that as you open the throttle (sorry, collective) you need quite a bit of right pedal to counter the torque. Failure in this basic skill converts the machine to a flying merry-go-round. Although we're all busy trying out our new found helicopter flying skills in Flight Simulator 2000, there has also been a noticeable increase in the sales of lottery tickets near the office and a lot of helicopter brochures seem to have appeared through the post...

We would like to express our grateful thanks to Captain J. M. Knowles RN, Wing Commander Dick Barton RAF and Lieutenant Commander Stan Burgess RN for making our visit possible and also to F.R.A. Services Chief Pilot Jerry English and Instructor Paul Ayres for their fantastic demonstration of the Griffin simulator. A special credit must also go to Ian Forshaw FBIPP for providing some great images to go with this feature.

And finally, a special thank you to Andy Digby, who would like us to point out that there is no truth in the rumour that he is leaving the DHFS to go and work as developer for a large company in Seattle.

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One of the newest pupils at DHFS frightens his instructor.

The low down on downloads

Have a FREE flight!



How to download from the Internet and install additional aircraft, panels and scenery for Flight Simulator

The sheer number of freeware and shareware aircraft, panels and scenery files that appear daily on the major flight simulator web sites is a fair indication that the authors of these enhancements are finally getting to grips with the idiosyncrasies of Flight Simulator 2000. This fact is perhaps underlined by the high quality of these files, which in many cases (as we highlighted in the last issue of PC Pilot), are better than those on offer from some of the commercial designers. Have a look at the downloads we've included on the free CD and judge for yourself. When it comes to value for money, if you look at a typical aircraft zip file you'll find they are roughly 200–400 Kb, which using a standard 56K modem will take under two minutes to download and that equates to less than 5p in telephone costs for most of us. Even quite complex panels are usually no more than 1.5–2Mb, resulting in a ten-minute local call costing off peak about 20p and good value compared with recent aircraft collections containing just three aircraft at nearly a fiver each.

However, we've had a constant stream of letters from readers who seem to have had

problems installing and managing these files, which is a shame because they represent an enormous wealth of free and in some cases exclusive files, not matched by any commercial product. In fact, there are enough aircraft types, scenery areas and adventure files to keep even the most avid flyer occupied for months. So let's have a look at the installation process, firstly using the manual approach and then we'll try one or two utilities currently available that are designed to automate the whole thing.

When you download an aircraft, panel, scenery area or other utility, the chances are it will be provided as a zip file. This is basically a file that's been compressed with the most popular file compression utility around, WinZip, which is available (free) from www.winzip.com. You'll need this or a similar program that can read zip files, in order to uncompress and install any files you download. In the majority of cases these files will be pre-formatted by the author into the correct directory structures ready for installation, but for our example we'll assume that this is not the case.

If we begin with an aircraft file that we downloaded from www.flightsim.com called cb76732k.zip, which happens to be a CityBird Boeing 767-300ER from William Shedd, (see the next section for more details). Firstly you need to use Windows Explorer to navigate to the directory where Flight Simulator is installed, the default directory being C:\Program Files\Microsoft Games\FS2000\Aircraft. Then go to the Aircraft folder and create a folder for your new aircraft, which in our case will be City Bird 767. You can call it anything you like but it seems sensible to call it something meaningful that you can identify at a later date. Next we have to create four more folders within our new 767 folder, called Model, Panel, Sound and Texture. This is where the files extracted from the downloaded zip file will eventually be installed.

Unfortunately, authors don't always provide read-me files, neither do they always stick to the recognised directory structures, so sadly it's impossible for us to cover every eventuality. However, moving on, the next stage is to unzip (uncompress) the original zip file into a temporary folder, ready to

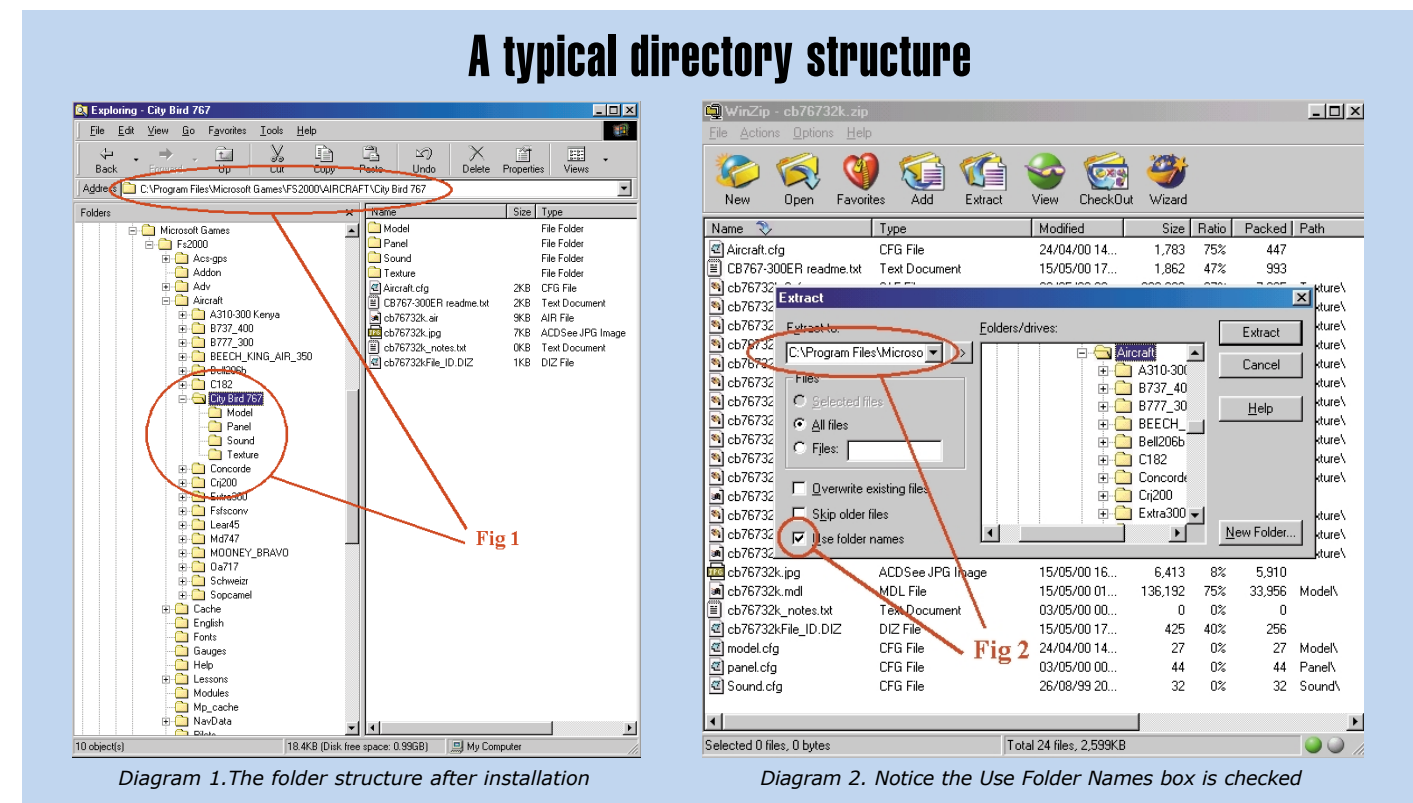


Diagram 1. The folder structure after installation

Diagram 2. Notice the Use Folder Names box is checked

transfer to our newly prepared aircraft folder. The number of files that end up in your temporary folder will vary depending on the complexity of the aircraft and how industrious the authors have been. For instance, in some cases the zip file may also contain a complete panel, new sound files and even more than one livery. As it happens the City Bird 767 is simply a new aircraft, so we can examine the file types to determine where they should be placed. There are eight file types in this instance, identified by the file extensions (the last three letters in the file name), as CFG, MDL, AIR, DIZ, TXT a variety of AF files and JPG.

Some of these files are not necessary for the installation but are simply pictures or text used for instructions or identification purposes. So any files ending in DIZ, TXT or JPG can simply be copied into the root directory of the Aircraft folder you just created i.e. City Bird 767. All the files ending with AF should be copied into the Texture folder and each of the files with the CFG extension should be copied into the folder that matches their name. For example the PANEL.CFG file is copied into

the Panel folder, the exception to this is the AIRCRAFT.CFG, which is copied into the root directory of the Aircraft folder like the DIZ, TXT and JPG files we mentioned earlier. In fact the same applies to the MDL file.

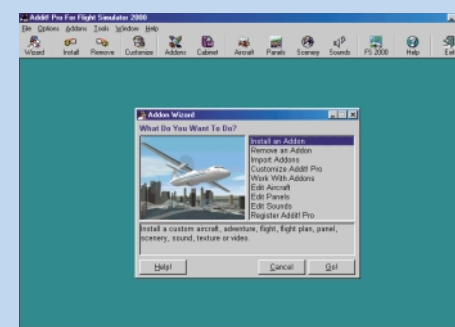
Having covered the worst case scenario, let's have a look at the same file but this time making use of the WinZip facility to extract the files to their correct folders in one operation. We should mention that some authors will prepare a directory for the aircraft as a whole but in this instance you'll still have to create the City Bird 767 folder first. Then you load the zip file as before into WinZip and if you notice on the far right of the dialogue, it shows the correct directories where the files should end up. That's because the author was thoughtful enough to assign them when he originally created the zip file. In order to extract them to their correct locations, you simply check the box marked 'Use Folder Names' in the bottom left corner of the WinZip extract dialogue. Then navigate to the C:\Program Files\Microsoft Games\FS2000\Aircraft\ folder, using the explorer style device in the 'Folders/drives'

section of the dialogue and hit the 'Extract' button.

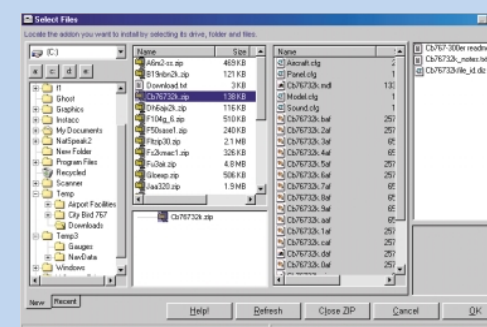
If all this seems a bit complicated the accompanying diagrams should make it clearer. Diagram 1 shows the location and structure of a typical aircraft directory including our City Bird 767 folder and diagram 2 shows the original zip file within WinZip with the relevant items marked in red as Fig 1 and Fig 2. We need to reiterate here that this is not the definitive guide to downloading and installing Flight Simulator 2000 aircraft, simply because of the diversity of designs and authors within the flight sim community.

Addit! Pro 4.0 for Flight Simulator 2000

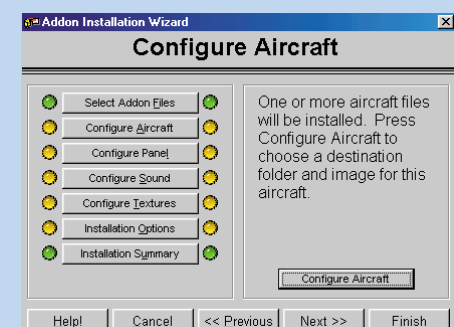
If you don't want to bother with all this file maintenance, then you need a program that can handle the housekeeping for you. Something that can install, uninstall, change panels or sound files and generally keep the whole process in some sort of order. As you might have guessed by now,



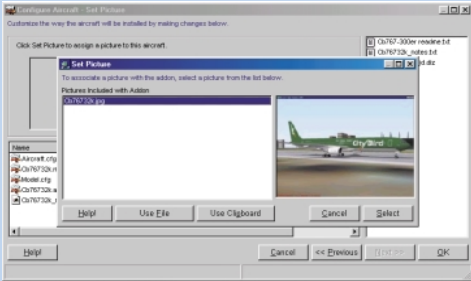
Addit!Pro's opening screen with installation wizard



The city bird zip file is selected



Next you configure the file ready for installation

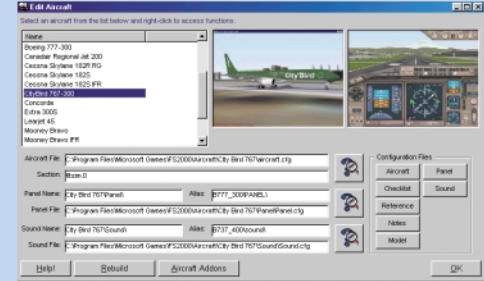


Assigning a picture for the AdditPro Database is pretty straight forward

there are a few products designed for that very purpose. The one we look at here is a shareware product from Joseph Stearn called Addit! Pro 4.0 for FS2000 and it's available to download from www.byteforge.com. The program is capable of handling everything, from installing new aircraft files, assigning new panels and sounds, to archiving them into Addit! Pro's file cabinet so your system remains tidy and more manageable. It will even remove them altogether back into separate folders or zip files. Don't worry this is quite safe, because Addit! Pro knows if any other add-ons depend on the files being removed.

To make things even easier, we've been very kindly given a trial version that you'll find on the free CD-ROM with this issue. Open up the CD-ROM in 'My Computer' and you'll find it in the folder marked 'Additpro'. You are free to use the program unregistered for a 30-day trial period but certain features are not available or restricted. For example you can only install a limited number of add-ons and you can't assign your own pictures to those you've already installed. After registering, these limitations are removed. In addition the registered version can automatically update Flight Simulator 2000's scenery library (Scenery.cfg). The implication being you don't have to locate, arrange, layer or enable the scenery files yourself.

The main interface is businesslike and sensibly designed, quite obviously by someone who uses the program, because there are no superfluous embellishments. It's quick and easy to use and in most cases offers a wizard to prompt you at each stage of the add-on's installation. It will readily accept zip files and in all the tests we conducted it offered a pertinent location for the particular file, immediately identifying what it was and what to do with it. You can import all your existing aircraft, panels and sounds, so you can reassign them to new aircraft, or remove those you never use. The ongoing management or re-allocation of add-ons is



The file is now installed and once a panel is assigned it will be ready to fly

easy once they've been added to Addit! Pro's database. The edit aircraft window allows you to change an aircraft's panel, sounds and assign your own pictures to make identification easier. Addit! Pro also identifies configuration file errors and can generate a report explaining the problems. It has separate Edit Panels and Edit Sounds windows to provide similar functionality for panels and sounds.



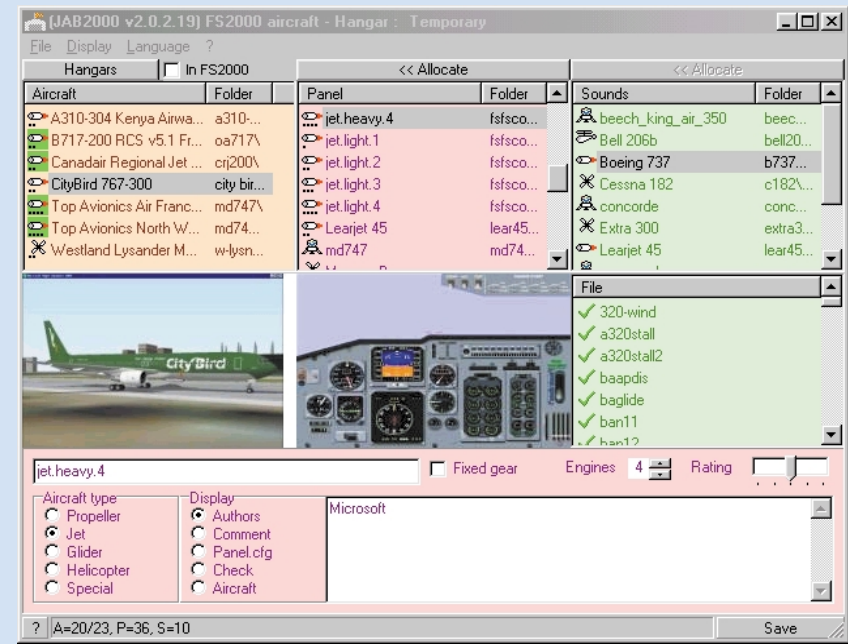
And finally.... with a minimum of fuss the City Bird is installed in FS2000

Finally any add-ons designed for Flight Simulator 5.X or Flight Simulator 95/98 can automatically be converted (with certain limitations) for use in Flight Simulator 2000. Altogether a well-rounded professional looking package that performs exactly as expected and good value at £13.00 if you intend to do a lot of downloading. ■

Joe Lavery

Better than a JAB in the eye...

If your budget doesn't stretch to Addit! Pro then you could try one of the many freeware products that offer similar features. One of the more notable ones we tried is JAB2000, written by Jacky Brouze and available from www.flightsim.com. JAB 2000 works in a different way to Addit! Pro and only handles aircraft, sounds and panels. You simply drag and drop the zip file onto the open JAB2000 window and the program automatically processes it, creating the necessary folders at the same time. The same facility to allocate panels and sounds to different aircraft is provided and you can move aircraft to a temporary folder, or have them suspended from appearing in the main Flight Simulator aircraft menu. JAB 2000 has one or two quirks and is not as robust as Addit! Pro, but as it's free, it's hardly fair to complain. Just for good measure, we've saved you the price of yet another phone call and you can find JAB98 and 2000 on our free cover CD-ROM in the folder marked 'Jab98 & 2000'.



The JAB2000 interface is rather basic

GET DOWNLOADING!

Here's a list of our favourite downloads for you to practice your new-found skills. Don't worry if you have problems, or you don't want to run up a huge phone bill, because we've saved you all the bother and put them on the cover CD-ROM.

Panels for Flight Simulator 2000

B777-300 Hi-Tech panel

This 777-300 panel has enough features to keep even the purists happy.

By: Einar H Bendigtsen

Download from:

www.flightsim.com

Filename: b777-300 hi-tech panel.zip



CRJ-200 Panel

Here is an excellent panel modelled on the Canadair Regional Jet series 200. The zip also contains a CRJ-200 Aircraft to complete the package.

By: David Durst and Bill Alderson.

Download from: www.flightsim.com

Filename: fs2kcrj200pl_pnv10.zip



Flight Simulator 98 Aircraft

Volpar Turbo 18P

The Turbo 18P was a proposed update of the standard Turbo 18 by Volpar Aviation in the 70s and was designed as a pressurised business class transport.

By: Dana McGee

Download from: www.avsim.com

Filename: turbo18p.zip



Utilities

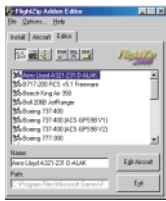
FlightZip

FlightZip is designed for those who have trouble installing Flight Sim add-ons. It's a freeware tool that that will extract ZIP files containing aircraft, panel, sound, adventure and scenery for FS98 or 2000 and install them into the correct directories. In addition FlightZip allows you to easily assign panels and sounds to different aircraft.

By: Arnt Helge Haaland

Download from: www.flightsim.com

Filename: fltzip30.zip



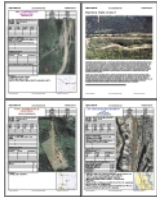
Flight Unlimited III Airports

This is pre-release version of the book FUIII Airports by Sergey Ostrozhinsky, offered as a 115 page Word document file. It contains descriptions of all the airports that can be found in Flight Unlimited III.

By: Sergey Ostrozhinsky

Download from: www.avsim.com

Filename: fu3air.zip



Flight Adventures

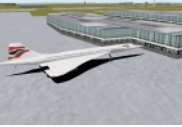
MV challenge - Concorde world tour

In this adventure by Michael Vone you climb into the pilot's seat for a 24-day, 22-stop, round-the-world tour in Concorde. This includes a few local excursions in the JetRanger helicopter, in the B737, and in the Learjet. No other add-ons needed.

By: Michael Vone

Download from: www.avsim.com

Filename: mvconuld.zip



Flight Simulator 2000 Aircraft

Mitsubishi Zero 21

This is a Mitsubishi Zero 21, A6M2b produced by S. Sekimori, depicted in the colours it appeared in on the first day of the Pacific War. The aircraft is designed for Flight Simulator 2000 Professional edition only and includes a basic cockpit.

By: S. Sekimori

Download from: www.flightsim.com

Filename: a6m2-ss.zip



F4U-1A Corsair

An authentic model of the F4U-1A Corsair flown by Major Gregory "Pappy" Boyington.

The aircraft is marked with 20 of Boyington's kills, as well as having both the name Lulubelle and the Major's details painted on it. It features a fully operational canopy with proper sound to throttle position and 52 other sound effects.

By: Roger "Airbuddha" Dial

Download from:

http://thehangar.dogfighter.com/CFS2_F4U-1A_Corsair.htm

Filename: Abd-F4U-1A.zip



Vickers Supermarine Spitfire IX

Here we have another classic warbird, the Vickers Supermarine Spitfire IX. It includes a fully detailed operational control panel and is a pleasure to fly.

By: Pegasus Aviation Design

Download from: www.flightsim.com

Filename: spit9.zip



SF260 (SIAI Marchetti)

The Marchetti is a 2-3 seat basic trainer and aerobatics aircraft of Italian design. This version features a tuned up turbo-engine, 3-bladed prop, 20-sided fuselage construction 256x256 BMP textures and full moving parts. The panel by Marco Spada is only usable with Flight Simulator 2000 default gauges plus Chuck Dome's Stickhand moveable gauge.

By: Graham P. Oxtoby

Download from: www.flightsim.com

Filename: sf2602k.zip



CityBird Boeing 767-300ER

This fantastic aircraft model includes every conceivable moving part.

By: William Shedd

Download from:

www.flightsim.com

Filename: cb76732k.zip



Raytheon/Beechcraft B1900D

A very well designed twin-engined commuter aircraft from Raytheon/Beechcraft. The B1900D Regional Airliner is depicted here in the Impulse Airlines "Snowy Mountain" Livery.

By: Barry Blaisdell/Bob May

Download from: www.flightsim.com

Filename: b19bn2k.zip



Scenery Areas

Kai Tak 2000, Version 2

This is probably the most detailed airport yet produced with more than 600 buildings around it, custom terminal buildings, highly detailed airport and tarmac and curved approach lighting. The scenery also requires, VOD textures and Airport 2.02 textures in order to work.

By: Thomas Kwong

Download from:

<http://ourworld.compuserve.com/homepages/cranenburgh/fs2000scen.htm>

Filename: kaitak2000v2.zip



Sao Paulo Intl. Airport

This is a realistic replica of Latin America's busiest airport, Sao Paulo International (Cumbica). The file is for FS2000 with default scenery and adds new taxiways, buildings, trees and dozens of static aircraft.

By: Saulo Junior

Download from: www.flightsim.com

Filename: saopaulo.zip



Flight Sim Training

Professional
instruction with
Bill Stack

BEFORE YOU START

OUR FLIGHTS AND AIRPORTS

In this pair of tutorials, we will fly from Glasgow, where we finished our previous flight, to Manchester. The straight-line distance is about 160 nautical miles, and the direction is south/southeast. The VFR flight will last about 1 hour and 15 minutes, and the IFR flight will last about 1 hour and 40 minutes.

With over 86,000 air transport movements serving over 6.7 million passengers a year, Glasgow Airport is the busiest of Scotland's three main international airports. Numerous international and regional airlines use this airport, including Aer Lingus, Air France, American Airlines, British Airways, KLM and Caledonian. It is eight miles west of Glasgow, south of the river Clyde and just north of the M8 motorway.

Manchester is one of England's busiest airports. It handles domestic and international flights and lies to the south of the city. It has one runway heading northeast/southwest.

OUR AIRCRAFT

As usual, we'll show you how to fly the tutorial in general-aviation aircraft, then you can try it in larger, more sophisticated aircraft if you wish. So for your first flight of this tutorial, use a small general-aviation aircraft such as a Cessna 172/182, a Beechcraft Bonanza or a Mooney Bravo. All estimated times are based on a Cessna 182RC. Somewhat longer or shorter durations might apply to other aircraft.

THE CHARTS

The Jeppesen charts used for these tutorials show the respective flight paths, landmarks, airways and navigation aids. Familiarise yourself with them in advance of each flight so you won't be fumbling with them during your flights.

THE WEATHER

For both flights, we'll use typical visibility and a mild wind from the west. Set your visibility at 10 miles, wind at 5 knots and direction at 280. These settings are consistent with weather reports we've been reading on the Internet lately. Before embarking on these flights, read our box about flying in winds in our Issue 4 tutorial.

For the VFR flight, we must not have any clouds in our flight path, or we cannot fly VFR. If you use clouds for your VFR flight, be sure they are at least 500 feet above our cruising altitude. For our IFR flight, we'll use an overcast that blocks all views of the ground for most of the flight. Set it at no lower than 500 feet MSL and as high as you like. Also, set your visibility at no more than 10 miles.

For the IFR flight, you may use broken clouds rather than overcast so you will see some urban lights between the clouds. You might

also choose 5 miles visibility to simulate light rain.

Set the temperature at whatever you like within reason. The current temperature in your area is as good as any.

NIGHT FLYING

Unlike the previous tutorials, we will fly this one at night. Visual flying at night is acceptable as long as visibility is above the prescribed minimums. IFR flying is always acceptable. Set the time in your flight sim program for anything that will provide the most darkness, such as light evening or early morning.

Lighting systems on the aircraft and at the airports help pilots see aircraft, determine their relative direction, and identify airport features in the darkness.

AIRCRAFT LIGHTS

Aircraft flying at night are required to use position lights and anti-collision lights. These lights enable the aircraft to be seen in darkness by pilots of other aircraft.

Position lights are steady red, green and white. The red light is on the left wingtip, the green light is on the right wingtip, and the white light is on the tail. The relative position of these lights from the viewpoints of other pilots tells those pilots the relative direction of flight. Seeing the red light to the left of the white light indicates the aircraft is moving from right to left of the observing pilot, and seeing the green light to the right of the white light indicates the aircraft is moving from left to right of the observing pilot. Seeing the red light to the right of the green indicates the aircraft is moving toward the observing pilot, and seeing the green light to the right of the red light indicates the aircraft is moving from the observing pilot. Those of you who are familiar with maritime position lights will recognise this system.

Anti-collision lights help pilots see other aircraft in the first place by drawing their attention. They can be one or more rotating beacons and/or strobes. The red rotating beacons are usually on the fuselage or tail, and the strobes are usually on the wings. The red flashing light and the bright-white strobe lights attract attention and are visible for many miles. Pilots are allowed to turn off strobe lights whenever their reflection from clouds presents a safety hazard to the pilot.

AIRPORT LIGHTS

Airport lights are used for making airport and runway features visible in darkness and low visibility conditions.

TAXIWAYS AND APRONS

Blue lights indicate edges of taxiways and aprons. Other lights and signs tell pilots where

to hold and where to turn off the runways onto the taxiways.

RUNWAYS

White lights generally indicate the edges of runways. On instrument runways, yellow replaces white on the last 2,000 feet or half the runway length, whichever is less, to form a caution zone for landing. On some precision approach runways, centreline lights are used. When viewed from the landing threshold, they are white until the last 3,000 feet of runway. Red and white lights alternate in the centreline for the next 2,000 feet, then they are all red for the last 1,000 feet.

AIRPORT BEACON

The rotating airport beacon at most airports shows alternating green and white and is visible for many miles.

In flight sim programs, airport ground lights are visible for up to about 10 miles unless visibility is set below that distance. When approaching a destination airport, you will be able to identify the airport area and the runway's relative position with these ground lights.

RUNWAY APPROACH LIGHTS

Runway approach lights are more complicated than other airport lights and there are many varieties of them. Because of space limits, we will explain only those relevant to this tutorial.

APPROACH LIGHTING SYSTEM

Manchester's runway 24R, on which we will land, uses an ALSF-2 approach lighting system.

ALSF roughly stands for 'approach light system with sequenced flashing lights'. The '-2' means it is suitable for the category II high-precision instrument approaches that airliners use. The ALSF-2 lighting system contains more high-intensity lights than any other approach lighting system, so it is quite visible in bad weather. It basically has three groups of lights: (1) red steady burning lights in three rows just beyond the runway's end, (2) white steady burning lights extending outward from the runway along its centreline and (3) white sequentially flashing lights within the white steady lights that appear to lead to the runway. ALSF-2 is more than adequate for general-aviation pilots like us.

Additionally, this runway uses three other types of lights to help pilots: PAPI (precision approach path indicators), threshold lights and touchdown zone lights.

PRECISION APPROACH PATH INDICATORS

PAPI consist of four white/red lights to the left of the runway alongside the touchdown zone. The number that are white or red indicates whether the aircraft is high, low or just right on a 3-degree glide slope. When three or four are



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These charts are NOT to be used for real-world navigation. They are for information ONLY.

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white, the aircraft is too high. When three or four are red, the aircraft is too low. When two are white and two are red, the aircraft is just right.

THRESHOLD LIGHTS

Threshold lights extend from left to right across the end of the runway. They show pilots where the runway begins or ends, depending on the point of view. When the pilot approaches the runway, the lights are green and show where the runway begins. Obviously, pilots should never touch down before reaching this green light. The lights at the opposite end are red, so the pilot knows where the runway ends. Pilots should not taxi beyond this red light.

TOUCHDOWN ZONE LIGHTS

Touchdown zone lights indicate the touchdown zone when landing under adverse conditions. They consist of two parallel rows of light bars to each side of the runway centreline.

You will encounter many varieties of lights and configurations at various airports. We don't have enough space in these tutorials to explain all of them.

OUR FLIGHT PLANS

We will use flight plans for both our VFR and IFR flights. Each tutorial explains what should be in each flight plan. In the real world, pilots would file their flight plan with ATC. In lieu of ATC, we will imagine that we have filed in accordance with regulations. We will keep our flight plan handy throughout the flight so we can easily refer to it. After our flight, we can file it in a folder or loose-leaf notebook, or we can discard it.

For the VFR flight, we could head straight for Glasgow, but we will fly a leisurely scenic path along the Irish and Scottish coastlines to make the flight more interesting and to practice following landmarks.

MONITOR YOUR PROGRESS AND STATUS

Throughout your flights, check your instruments for the status of your aircraft and instruments. Especially monitor your engine temperature, oil pressure and fuel-flow gauges. Also check your position frequently to be sure you are on course. In the VFR flight, use ground references and time/speed/heading to track your progress. In the IFR flight, use radio navigation aids as well as time/speed/heading.

COMPENSATE FOR WIND

The winds we are using in these tutorials will blow your aircraft off course. Refer to the tutorial in Issue 4 for detailed explanation of wind compensation, the wind triangle and the calculation of wind-correction headings.

VFR (Visual Flight Rules) Tutorial

Part 6

Scotland to Northern England at night - visual flying in darkness

This flight from Glasgow to Manchester in darkness will be as close to instrument flying and navigating as we can get while still flying under VFR. We will use our flight instruments to tell us about our heading and attitudes and our navigation instruments to guide us to our destination.

Most of this flight will be rather mundane. There won't be much to see outside the aircraft in the darkness and there won't be many course changes. Therein lies its challenge: maintaining altitude, course and interest throughout. While simulating aerobatics, aircraft landings and dogfights might be more exciting, simulating realistic general-aviation flights can be more challenging and therefore more rewarding.

For outside navigational information during night flights, visual pilots rely mostly on lights. Urban lights, lighted towers and airports are the most common sources. Vehicle headlights can help pilots locate country roads and motorways in the darkness, but they are not precise navigational aids. The flashing lights of other aircraft help pilots avoid them in the darkness. In most flight simulators, however, urban areas and airports provide the only available lights at night.



Glasgow VFR departure at night

Monitoring your flight, aircraft and navigation instruments and correcting heading and attitude drifts are necessary for the entire en-route portion. Outside references will be too few for accurate navigation and safe flight.

Trust your instruments, and beware of spatial disorientation. Without references from outside, pilots can lose track of their position relative to the horizon. This is especially true for VFR pilots who usually lack enough training and experience with relying totally on their instruments for this information.

Our flight path and durations are shown on our flight plan. Normally, pilots would make their flight plans in duplicate, submit a copy to ATC and use their original in the cockpit. In lieu of ATC, we will make one flight plan, use it during our flight and file it after our flight in a folder or loose-leaf binder.

Pilot <i>PC Pilot</i>		Flight-Sim Flight Plan		Date:	
Flight Rules (circle one)	Aircraft Type	True Airspeed	Departure Time	Cruising Altitude	Arrival Time
VFR	<i>Single engine</i>	<i>140 kts</i>		<i>5,500 MSL</i>	
Flight Route		Nav aids & Frequencies	Headings *	Distances	Durations*
Landmarks					
<i>Depart Glasgow, Scotland</i>			<i>233</i>		
<i>Glasgow VOR (GOW) 115.4 (ground)</i>			<i>157</i>	<i>10 nm</i>	<i>5 mins</i>
<i>Dean Cross VOR (DCS) 115.2 (ground)</i>			<i>157</i>	<i>72 nm</i>	<i>30 mins</i>
<i>Dean Cross VOR (DCS) 113.5 (ground)</i>			<i>160</i>		
<i>Manchester VOR (MCT) 113.55 (ground)</i>			<i>160</i>	<i>86 nm</i>	<i>55 mins</i>
<i>Manchester Airport</i>				<i>6 nm</i>	<i>5 mins</i>
		<i>Right-base pattern</i>			
				<i>173 nm</i>	<i>75 mins</i>
<i>Adjust all headings for winds</i>					
<i>All durations are approximate</i>					

REVIEW YOUR CHARTS

The VFR charts show our course from Glasgow to Manchester, including the radio navigation aids and landmarks for getting us there. Familiarise yourself with your course and navigation aids before taking off, so you won't have to fumble around trying to figure them out en-route. Real cockpits have little room for chart reading and not much interior light at night.

PREPARE YOUR AIRCRAFT

Be sure to prepare your aircraft for flight before taking off by setting your radios and gauges and turning on your lights.

SET YOUR RADIOS

Set your radios and instruments for the frequencies and radials you will need as shown on the charts: (A) Glasgow VOR (GOW) 115.4 on Nav1 and Dean Cross VOR (DCS) 115.2 on Nav2. If you don't have a Nav2, be prepared to switch your Nav1 to DCS half way there. If your radios enable the setting of standby frequencies, enter the frequencies you will use next. Otherwise, you will need to change these frequencies when necessary. Set your OBI for 157, because that's the first VOR radial you will use during this flight.

SET YOUR GAUGES

Set your altimeter for local barometric pressure. Even slight altimeter errors can lead us to believe we are above or below our actual altitude, which can cause real problems for other aircraft using these airspaces.

TURN ON YOUR LIGHTS

Turn on the lights you need for this flight. The position lights must be used during all night flights (they are usually called 'navigation' lights on the switch

the radial, you will fly past it and need to fly back a bit. Adjust your heading as needed to maintain your track along that radial.

Continue climbing steadily toward our cruising altitude of 5,500 feet MSL. This altitude is fitting for several reasons. (1) It will be under the charted IFR airways, (2) it will keep us well above the mountains north of Manchester, (3) it will enable us to receive the VORs we will use for guidance, and (4) it is within altitude requirements for VFR flights heading between 090 and 189. Use elevator trim or autopilot to maintain your cruising altitude, as you choose.

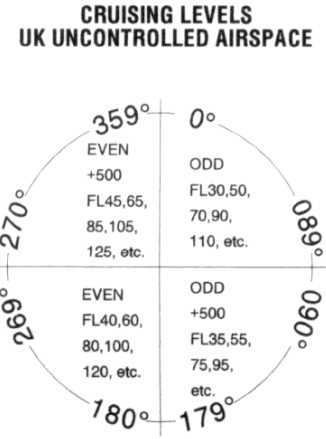
Pilots would normally notify Glasgow tower that they are leaving the airport's airspace, then contact en route ATC. Simulate this contact yourself in lieu of ATC features in your simulator. Be sure your aircraft is on course and is climbing at the desired rate or maintaining desired cruising altitude, whichever is appropriate at the moment. Attitude and heading changes are difficult to discern in darkness, so you must rely on and trust your instruments for this information.

The cross wind will push your aircraft eastward, or to the left, for nearly all of this flight. Therefore, adjusting for winds, monitoring your position and correcting as needed is crucial throughout the flight.

This 75-mile portion of our flight will last about 30 minutes.

For the first several minutes after taking off, you should see Glasgow's urban lights to the left. You might still be in the Glasgow urban area when you reach your cruising altitude. As you embark on your 157 course, you should see urban lights in the distance to your front right. Those areas are Kilmarnock, Irvine and Prestwick. They should pass to your right and begin fading into the distance in about 10 minutes. The last urban area associated with Glasgow will be East Kilbride. For about 30 minutes, there will be no lights for guidance.

Your VORs and their DMEs are major information sources on this flight. By reading the distance from or to a VOR, you can plot your position along your course. Additionally, you can calculate your estimated arrival time at the next VOR by using the distance and speed. For example, if you are 30 miles to DCS and flying at 150



knots, you can expect to arrive at DCS in 12 minutes. Plotting your positions and estimating your arrival times are two ways of passing the time during an otherwise mundane flight.

Keep tracking your course from GOW until you are 40 miles from it, which is about half way to DCS. Then tune DCS at 115.2 and track your course toward DCS.

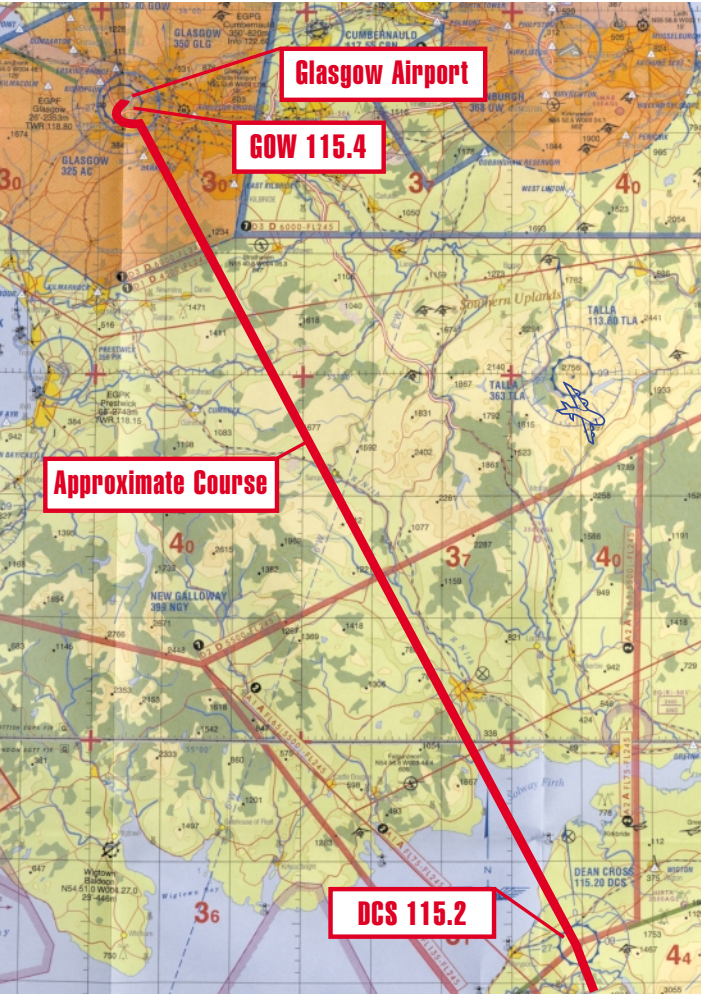
When you arrive at DCS, turn right slightly and head 160 toward Manchester. Continue to track your course from DCS until you are 45 miles from DCS or if the station fades first. Then, tune Manchester VOR (MCT) at 113.55 and track it to Manchester. This 90-mile leg of our flight will last



Manchester final approach at night

about 35 minutes. As before, maintain your attitude, heading, course and interest throughout this leg.

You will eventually approach a more populated area of Lancashire, so more urban lights will appear ahead, left and right. First, Preston appears on the horizon ahead and to the right. Soon thereafter, Blackburn appears on the horizon straight ahead. Finally, the urban lights of Manchester and its suburbs spread across the horizon ahead. Eventually, your aircraft will be surrounded by urban lights as you fly over metropolitan Manchester.



Source: Jeppesen EG-3 & EG-4. Red notations by PC Pilot. For flight simulator use only

BEGIN APPROACHING MANCHESTER AIRPORT

When 20 miles from MCT according to your DME, disengage the autopilot (if you are using it), reduce airspeed to about 120 knots and begin a 500 feet-per-minute descent to 2,000 feet MSL. Manchester Airport's elevation is 256 feet, and there are some highlands, towers and buildings in the area.

As soon as you begin descending, tune Manchester ATIS for general information at 128.17. Then contact Manchester tower at 118.62 and announce your intentions to land there, or simulate this contact yourself. ATC manages this busy commercial airport strictly.

Adjust the aircraft for the changing air density and new flight phase: (1) Fuel mixture rich, (2) propeller RPM high, (3) landing lights on, (4) carburettor heat on and (5) altimeter consistent with local weather report.

Normally, ATC at this busy airport would vector VFR aircraft for a straight-in approach among the IFR traffic, so we will simulate a typical procedure ourselves in lieu of ATC radar vectoring.

At about ten miles from MCT, the airport's blue field lights should appear on the horizon straight ahead (if your visibility is set for at least 10 miles, of course). Once you attain your 2,000 feet MSL altitude, use your elevator trim to maintain your altitude in the airport's airspace.

JOIN THE AIRPORT TRAFFIC PATTERN

Continue heading toward the airport. You no longer need to adhere to the VOR radial, because being able to see the airport renders radio navigation aids unnecessary for a visual flight.

Because of our westerly wind, we will land on runway 24R. With Manchester being a controlled airport, VFR pilots would normally follow guidance from the tower. In lieu of this guidance in our flight simulators, we will follow the most likely procedure for an approach from this direction and a landing on this runway. Throughout this procedure, keep alert for other aircraft using this busy airport's airspace.

When you are about two miles from the airport, turn left and head 060 for a right-downwind approach. This will be a right-turn traffic pattern with a typical downwind leg, base leg and final



approach using right turns instead of left turns. Then notify ATC of your intention to land on 24R. Descend gradually as normal for a downwind leg of an airport traffic pattern. After you see the airport runway out your right-rear window, turn right and enter a base leg, then turn right to a final approach. Use the runway approach lights to guide you in.

LAND AT MANCHESTER

Land on Manchester's runway 24R normally. For this flight, the winds will be nearly a full headwind. Refer to our third tutorial for how to land in winds. Be sure to exit the runway after landing, or your otherwise successful flight will be tarnished by a ground violation!

CONGRATULATIONS!

You have just navigated about 175 miles at night under visual flight rules using radio navigation and a little pilotage. This is about as close as you can get to flying on instruments while still flying VFR. For more challenge, fly this route again with stronger winds and/or a more sophisticated aircraft. For more information about visual navigation, read Bill Stack's Flight-Sim Navigation at www.topskills.com/flitsim.htm.

PC Pilot Tutorials are officially approved by TopSkills

Bill Stack is an expert flight simmer, the author of numerous training manuals for flight simulation computer programs and the owner of TopSkills in the USA. TopSkills publishes and distributes reference and self-learning books about flight simulation and other subjects.

The books that cover various flight sim subjects are:

Flight Sim Pilot's Information Manual 1999

Instrument Flying for Flight-Simulation Pilots

Flight Sim Navigation

Flight Sim Maneuvers and others....

All these great books can be obtained by visiting the TopSkills web site at www.topskills.com

Nels Anderson, technical advisor for these tutorials, is a general aviation pilot and president of www.flightsim.com

IFR (Instrument Flight Rules) Tutorial

Part 6

Instrument flying at night from Glasgow to Manchester

This 225-mile, 90-minute, instrument flight from Scotland to northern England requires another challenge, that of navigating at night. We will use all the instrument flying and navigating skills explained in our previous five tutorials with the new challenge of nearly zero light.

Our flight plan reflects our flight path and durations. Normally, pilots would make their flight plans in duplicate, submit a copy to ATC and use their original in the cockpit. In lieu of ATC, we will make one flight plan, use it during our flight and file it after our flight in a folder or loose-leaf binder.

Avoid using GPS with this tutorial, at least on your first flight, so you can practice locating fixes by VOR triangulation.

READ YOUR CHARTS

The charts show the instrument procedure for departing Glasgow, the en-route airways to Manchester and the instrument procedures for approaching Manchester. Familiarise yourself with all relevant aspects of these charts before taking off so you won't have to fumble around in the aircraft trying to figure them out. Note that some of the instrument procedure charts are not to scale, so the courses depicted on them are not precisely drawn. On these charts, follow the textual directions and use the graphical depictions for comprehension only.



The instrument panel at night

Manchester runway 24R approach lights and guides

Pilot: <i>PC Pilot</i>		Flight-Sim Flight Plan		Date:	
Flight Rules (circle one)	Aircraft Type	True Airspeed	Departure Time	Cruising Altitude	Arrival Time
VFR IFR	<i>Single engine</i>	<i>140 kts</i>		<i>7,000 MSL</i>	
Flight Route					
Landmarks	Navids & Frequencies		Headings	Distances	Durations *
	<i>Glasgow STD (TLA 4A)</i>		<i>As shown</i>	<i>58 nautical miles</i>	<i>26 minutes</i>
	<i>A2 Airway</i>		<i>135</i>	<i>47 nm</i>	<i>20 mins</i>
	<i>Manchester STAR ROS 1B</i>		<i>As shown</i>	<i>74 nm</i>	<i>32 mins</i>
	<i>Manchester IAP VOR/DME Rwy 24R</i>		<i>As shown</i>	<i>46 nm</i>	<i>20 mins</i>
	<i>Manchester Airport</i>			<i>225 nm</i>	<i>98 mins</i>
<i>*Durations are approximate</i>					
Origin Airport		Destination Airport		Alternate Airport (IFR only)	
Name: <i>Glasgow EGPF</i>		Name: <i>Manchester EGCC</i>		Name: <i>Liverpool EGGP</i>	
Elevation: <i>26</i>		Elevation: <i>246</i>		Elevation: <i>81</i>	
ATIS: <i>129.57</i>		ATIS: <i>128.17</i>		ATIS:	
Tower or Departure: <i>119.1</i>		Tower or Arrival: <i>118.62</i>		Tower or Arrival: <i>118.1</i>	
				Estimated Duration <i>98 mins</i>	
				Fuel Needs <i>40 gallons</i>	
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percent, or 231 feet of altitude for every nautical mile downrange up to 1,200 feet above mean sea level (MSL). Then a gradient of 5.8 percent, or 352 feet per nautical mile up to 6,000 feet MSL.

The table on the SID chart shows that at climb airspeeds between 75 knots and 100 knots (which fits the general aviation aircraft we will fly) a climb gradient of 231 feet per nautical mile is achieved by a vertical climb speed of no less than 385 feet per minute. This system for determining climb rates is a bit confusing yet fully sensible. A standard feet-per-minute vertical climb speed would not work for all aircraft that use this airport because of their various climbing velocities.

The routing and altitudes for this SID are specified in the 'Routing' and 'Altitude' boxes in the table at the bottom of the chart.

The entire SID from take-off to TLA is about 58 miles and should last about 30 minutes.

En-route

The en-route chart shows the airways, navigation aids and fixes we will use between the Glasgow

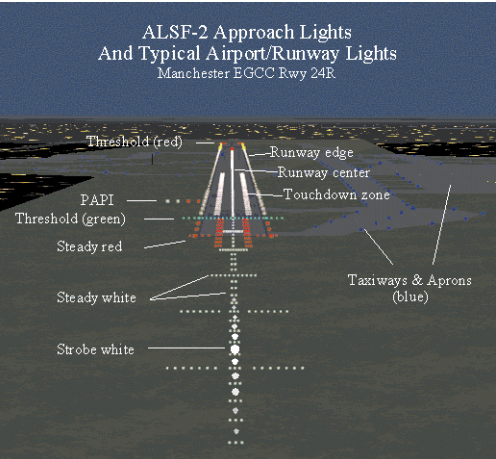
and Manchester airport procedures. Because of the lengths of the departure and approach procedures, the en-route course along the A2 airway is rather short and simple – 47 nautical miles from TLA and Dean Cross VOR (DCS).

The minimum en-route altitude for the A2 airway is 7,000 feet MSL. For southerly routes, IFR altitudes for headings between 180 and 269 are even numbers such as 6,000 feet MSL and 8,000 feet MSL, so we must climb to and maintain at least 8,000 feet MSL for the duration of this leg. Let's use 8,000 feet MSL, which is approximately the desired cruising altitude for most general-aviation aircraft. If you fly this route in a larger, faster aircraft later, you may choose a higher altitude.

Arrival

The STAR (standard terminal arrival) chart shows the procedures for transitioning from the airway to the IAP (instrument approach procedure).

The STAR shows three possible arrival procedures. All of them end at a fix named 'ROSUN', so they are named ROS 1A, ROS 1B and ROS 1C. Because we will be



arriving at below 14,000 feet MSL, we must use ROS 1B. It leads aircraft from DCS to a fix named SETEL, then to ROSUN. SETEL is 20 miles from Pole Hill VOR (POL) on its 329 radial, and ROSUN is 19 miles from MCT on its 356 radial.

A holding pattern is anchored on ROSUN. If traffic volume is heavy, Manchester ATC can use this holding pattern to provide sufficient distance between aircraft approaching for landing.

The chart clearly states that altitudes and airspeeds are as directed by ATC and that the lowest altitude is 7,000 feet MSL. In lieu of ATC, we will maintain 7,000 feet MSL throughout this procedure.

Approach

The IAP chart shows the procedures for aligning the Manchester runway for landing. Simply stated, the IAP calls for heading south to MCT, then turning around and heading northeast, then turning around again and heading 236 for landing. It also shows that much of the procedure is done at 3,000 feet MSL.

PREPARE YOUR AIRCRAFT

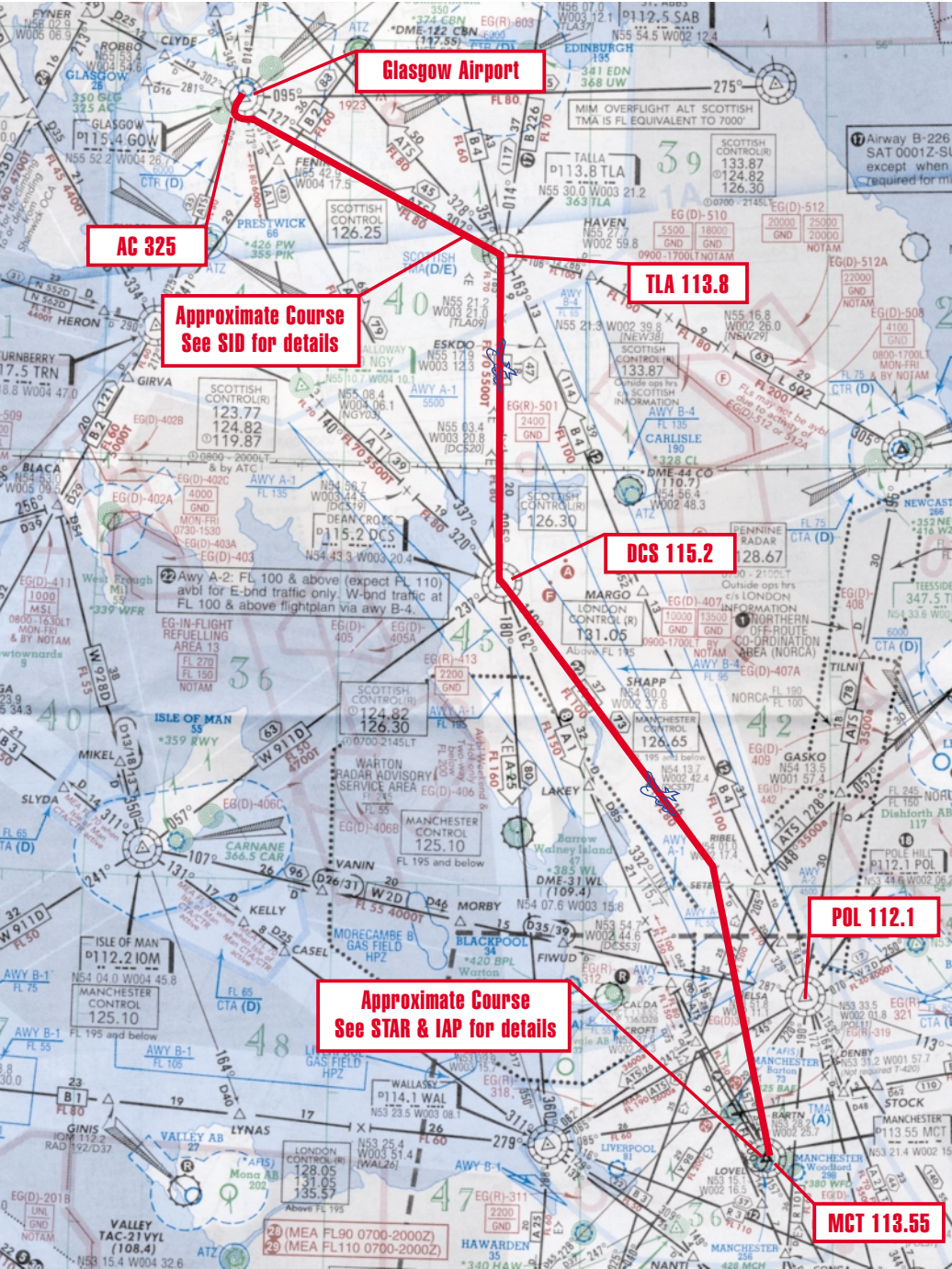
Be sure to prepare your aircraft for flight before taking off by setting your radios and gauges and turning on your lights.

Set your radios

Set your radios and navigation instruments for the frequencies and radials you will need as shown on the charts. Tune your ADF to 325 for Glasgow NDB (AC), because that is the first navaid you will use after taking off. Also tune your Nav1 to 115.4 for Glasgow VOR (GOW) and your Nav2 to 113.8 for Talla (TLA). If you don't have a Nav2, be prepared to switch your Nav1 to TLA during the departure procedure. If your radios enable the setting of standby frequencies, enter the frequencies you will use next. Otherwise, be prepared to change to these frequencies when necessary. Set your OBI for 283, because that's the first VOR radial you will use during this SID procedure.

Set your instruments

Set your altimeter for local barometric pressure. Precisely following this SID requires us to be where we should be when we should be there. Even a slight altimeter error can make us believe we are enough above or below our actual altitude to create real problems for other aircraft using the airspace - aircraft we cannot see and who cannot see us because of the low-visibility weather conditions that mandate our instrument flight.



This is the route we shall take on our flight from Glasgow to Manchester

Turn on your lights

Turn on the lights you need for this flight. The position lights must be used during all night flights (they are usually called 'navigation' lights on the switch labels, although they are not used for navigation). Strobes are required except when their reflections from clouds would present a safety hazard to the pilot. Because we will through clouds during this IFR flight, we can leave the strobe off. 'Landing' lights are recommended for taking off and whenever below 10,000 feet MSL. Even though their use is not required, let's use them anyway.

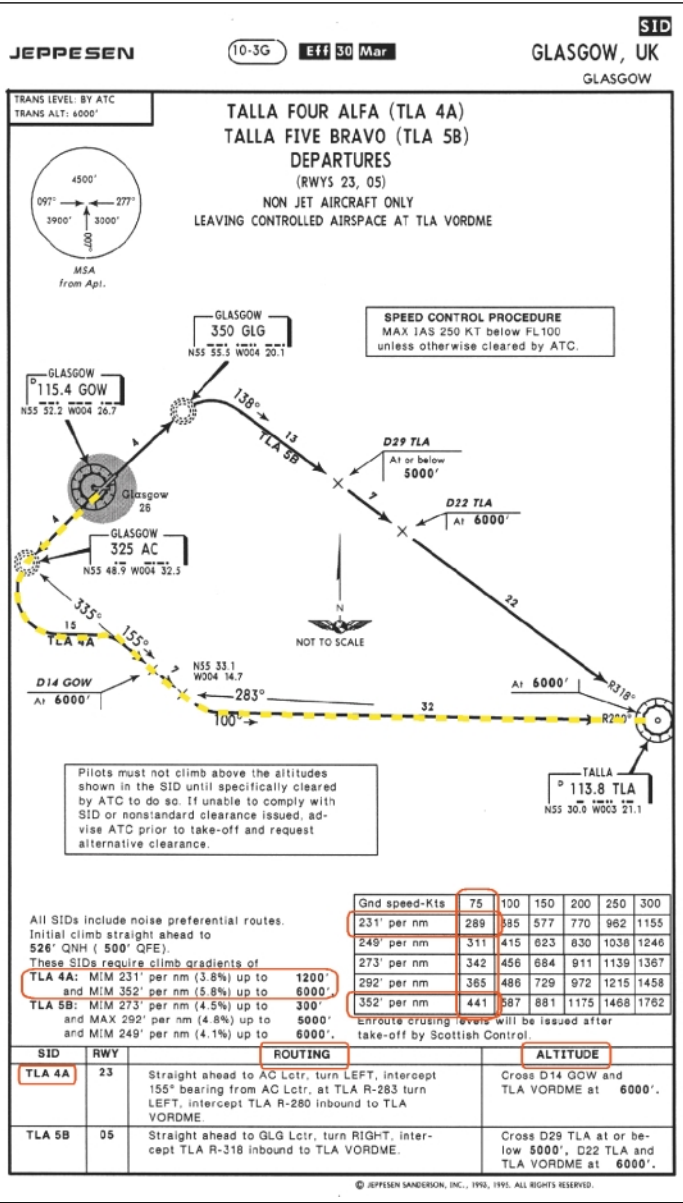
PLOT YOUR POSITION

During your flight from Glasgow to Manchester, be sure to maintain your track within the appropriate airways. Plot your position frequently and adjust your heading as necessary to stay on course. The 280 cross wind will push us toward the left for most of this flight. This means that our track will drift off course unless we maintain our vigilance. In England's congested airspace, drifting off course can be a serious safety hazard, so we must be aware of our position throughout the flight.

For several legs of this flight, you won't have much to do but monitor your navigation

instruments, track your position and monitor your aircraft's status. This is what real-world pilots mean when they say instrument flying is 90 percent boredom and 10 percent frenzy. For those simmers who want supreme flying challenges, maintaining your attention during this uninteresting aspect of instrument flight is quite challenging. Lose attention, and you can find yourself off course and scrambling to get back on track.

Tracking your position is a simple matter of staying on course and using your navids, navigation instruments and clock to plot your distance from point to another.



The standard instrument departure (SID) for Glasgow's runway 23

TAKE OFF NORMALLY

Take off as normal, including cockpit preparation and appropriate ATC clearances, as explained in our previous tutorials. For space considerations, we will not repeat aspects in each tutorial. Read the previous tutorial about taking off in winds for additional information.

DEPART GLASGOW

Talla 4A calls for several manoeuvres. First, it requires flying straight from runway 23 to 500 AGL (526 MSL) and proceeding to Glasgow NDB (AC) 325, which is four miles from the airport. This leg should take about three minutes.

Next, it calls for turning left and intercepting the 155 bearing from AC, then turning right and heading 155 degrees from this NDB. Because the chart doesn't

specify a turn radius, turn at a standard rate here.

Once the NDB bearing is intercepted, continue climbing to the required 6,000 feet MSL altitude toward the next fix, which is D14 GOW. This fix is 14 nautical miles by DME (distance measuring equipment) from GOW on AC's 155 bearing. This leg is about 15 miles and should take six or seven minutes depending on your airspeed.

The next fix is at the intersection of the 155/355 bearing of AC and the 283 radial of TLA. It is not labelled, but it is shown by an "X" along the flight path. Switch your Nav1 to TLA so you can determine your arrival at this fix. At seven miles from D14 GOW, this fix should be reached in about three minutes. When you reach it, turn left and head 100 toward TLA.

Adjust your heading as necessary to fly toward TLA along its 100/280 radial. This leg is 32 nautical miles and should last about 13 minutes. Upon reaching TLA, we will exit the SID procedure and join the airway to Manchester. This leg provides a good opportunity to revisit the en route charts and prepare for the en route portion of this flight.

JOIN THE AIRWAY

About one mile from TLA, join the A2 airway by turning right and head 185 toward DCS along TLA's 005/185 radial. If you wait to cross the VOR before turning, you will fly a mile or so in the wrong direction. Also, set your Nav1 for DCS and your Nav2 for TLA. In lieu of Nav2, switch your Nav1 to DCS about half way between TLA and DCS, which would be about 24 miles from TLA.

Climb to our chosen altitude, which is 8,000 feet MSL for this flight. Remember to adjust your aircraft as necessary for the altitude. Use elevator trim or autopilot to maintain your altitude, adjust propeller pitch and fuel mixture and use pitot heat if temperatures are cold.

The chart shows that this airway is 47 nautical miles between TLA and DCS. At a 150-knot airspeed, we should reach DCS in about 20 minutes. Upon reaching it, we will exit the A2 airway and join the STAR for Manchester. The last half of this leg is an ideal opportunity to revisit the STAR and prepare for this final portion of our flight.

JOIN THE MANCHESTER STAR

When you reach DCS, exit the A2 airway and join the STAR for southern arrivals at Manchester. Pilots would normally notify ATC en-route that they are leaving the airway, and then contact Glasgow approach.

Join the STAR by turning left to a heading of 149 and descending to designated altitude of 7,000 feet MSL. Then head for the fix named SETEL, which is at the intersection of the 176/356 radial of Manchester VOR. This point is 53 miles from DCS and about 20 miles to POL along their 149/239 radials. Reset your Nav2 for DCS (115.2) and your Nav1 for POL (112.1). Use these readings to determine your arrival at SETEL. With this fix being 53 miles from DCS, getting there will take about 20 minutes.

When you reach SETEL, turn right and head 176 toward ROSUN. Reset your Nav1 for MCT. Continue heading 176 directly toward Manchester. When you are 19 miles from Manchester along this radial, you will be at ROSUN.

At ROSUN, you have two choices. (1) You may presume low air traffic and exit the STAR and join the IAP, or (2) you may presume heavy air traffic and fly the holding pattern to simulate this common aspect of instrument flying. If you chose the first option, skip the next section.

Without the holding pattern, this STAR from DCS to ROSUN is 74 miles and will take about 30 minutes at 150 knots. The holding pattern could take another four or five minutes.

Flying the Holding Pattern

At ROSUN, enter the holding pattern with a standard-rate, 180-degree right turn. After exiting this turn, head 356 on the pattern's holding side (which heads from the ultimate destination) until you reach the fix named BURNI. This fix is 24 miles from MCT and 15 miles from POL on its 271 radial. Use these readings to determine your arrival at BURNI.

At BURNI, turn right 180 degrees in a standard-rate turn. Upon exiting this turn, you should be back along MCT's 176/356 radial and heading straight for MCT at 176. If not, adjust your heading as needed to get back on course. Be sure to maintain airspeed, altitude, turn rate and headings throughout the holding pattern. Normally, holds are more complicated than this, but we lack space for a detailed explanation in this tutorial.

Fly this holding pattern as many times as you like, then consider that ATC has released you. Sometimes, ATC holds aircraft in these patterns for several loops.

EXIT THE STAR, JOIN THE INSTRUMENT APPROACH PROCEDURE

Once you decide to proceed toward the airport, exit the STAR and join the IAP.

Be sure adjust the aircraft for the changing air density and new flight phase: (1) Fuel mixture rich, (2) propeller RPM high, (3) landing lights on, (4) carburettor heat on and (5) altimeter consistent with local weather report. Also, check your landing lights to be sure they are on.

Head 176 toward MCT and descend to 3,000 feet MSL. With

MCT being 19.1 miles away, you should easily be able to reach this altitude before reaching MCT.

If you were using your autopilot to maintain altitude, disengage it now and use your elevator trim for the remainder of the procedure. Adjust your propeller and mixture for the lower altitudes. Be vigilant about holding your courses and altitudes throughout this procedure, because this airspace is very busy and there are numerous obstacles in the Manchester area. Set Nav2 to receive MCT, and set Nav1 to receive the ILS signal (INN 109.5) and set the needle on 236, which is the runway heading. You won't need this gauge yet, but it will be ready when you do.

Upon arriving at MCT, enter the holding pattern by turning right and heading 206 for one minute. Then, fly 236 along the holding side for one minute. Then turn 180 right at standard rate to a heading of 056. If you are not

heading straight for MCT at this point, adjust your course as necessary to intercept MCT.

Upon arriving at MCT the second time, head 056. When your Nav2 DME shows you at 8.3 miles from MCT along this 056/236 radial, you are at the fix named D8.3 MCT. At this point, begin the procedure turn that will align you for landing on runway 24.

Execute your procedure turn as follows: Turn left and head 011 for 60 seconds, then reverse course with a 180-degree standard-rate right turn and head 191. The chart doesn't specify the type of procedure turn and this 60-second timing will give you room for error.

Just before your OBI needle reaches the centre, which indicates that you are about to intercept the localizer, turn right and head 236 toward the runway.

Follow the ILS localizer and glide slope to the runway as explained in previous tutorials and use the

runway approach lights to guide you in. After landing, exit the runway promptly.

MISSED APPROACH?

A missed approach is necessary if your position is not favourable for landing. According to the chart, the runway must be visible from 449 feet MSL along the glide slope, which is only 200 feet above the ground! That's partly what a precision approach is all about. A decision altitude could not safely be this close to the ground on VOR or NDB approaches. Also, your aircraft should be within 30 degrees from the runway centreline. If you've followed the localizer, this should not be a problem. Do not force a landing from a bad position, as it will invite a hard landing or a crash.

If this airport has a missed-approach procedure, it is not explained on the chart. Instead, the chart instructs pilots to climb

to 3,500 MSL and follow ATC directions. Our suggestion in lieu of ATC is to execute the holding pattern anchored on MCT, then repeat the IAP from there.

CONGRATULATIONS

You have successfully flown en-route from one airport to another on instruments with your visibility diminished by darkness and with a mild wind. Well done, indeed!

Keep flying this tutorial to build your proficiency. Apply stronger winds and turbulence and advance to more sophisticated aircraft to make it more challenging if you like.

For more information about instrument flying, read Bill Stack's Instrument Flying for Flight-Sim Pilots - available from www.topskills.com/flitsim.htm.

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Continuing our series of features explaining the workings of a modern light aircraft, Stephen Heyworth explains what the 'fully moving control surfaces' that we now take for granted in flight simulation, are actually used for on the real thing.



A typical aircraft wing showing the ailerons and flaps

YOU HAVE CONTROL!

Don't get in a flap

Flying is a highly complex task that requires the pilot to handle several things at the same time, including the flying controls, the radio, navigation, the engine and all the essential checks. A significant part of the skill of flying is training your subconscious to manage as many of these as possible. It is important, when you are at 300 ft on a final approach, that you listen to and understand the controller's call "Golf Sierra Hotel, cleared to land, wind 325 degrees 18 knots". If you are concentrating hard on everything else, you are likely to hear "blah blah cleared to land blah blah", and won't even consider whether the surface wind is within your limits. The first, and the most important, skill allocated to the subconscious is the use of the controls. You should think about what you want the plane to do, but not which control to move to make it happen. It is the fundamental skill of flying and this is why one of the very first lessons that a trainee pilot will be given is the 'effects of controls'.

The main controls

We will start by looking at what actually happens when you move the controls. The most obvious of these is the joystick, yoke or control column, all of which do the same thing. Have a look at the diagrams as you read the descriptions. These diagrams represent what you would find on many

light aircraft, however they are simplified for clarity. Most control cables will actually have several pulleys to direct them around obstacles such as the passenger compartment or the doors and windows of high wing aircraft.

Side-to-side movement of the joystick controls the ailerons, which are on the outermost trailing edge of the wings. Push the stick to the left, or roll the yoke anticlockwise, and two things happen; the left aileron moves up and the right aileron moves down, and vice versa. The forward and backward movement of the joystick controls the elevator at the back of the plane. It is the hinged part at the back of the horizontal stabiliser. The elevator moves up when you pull the stick back and moves down when you push. Some aircraft have stabilisers or all moving tails. In these, the whole tailplane moves, instead of having the traditional fixed tailplane with the moving elevator pivoted from it.

The two rudder pedals are equally simple. They are always used to control the rudder, and often used to control the nose or tail wheel. Press the left pedal and the rear of the rudder moves to the left. If there is a steerable nose or tailwheel, what happens is quite surprising at first glance to many people. If the plane is moving forwards, pressing the left pedal will turn the plane left, which is the opposite way round to bicycle handlebars.

The pedals also have another trick on most modern planes. If you rock your feet forwards on them, or press with your toes, you will apply the brakes to the main wheels. Your left foot operates the brake on the left main undercarriage wheel and the right foot operates the right-hand one. Now this all hangs together fairly well, because whether you are in the air or on the ground, pressing the left pedal or toe brakes will turn you left. It is worth a quick mention that many aircraft have freely castoring nose or tailwheels. These planes can only be steered on the ground by using the brakes, which may not be fitted either, or by a burst of power blowing the slipstream over the rudder.

If you ignore such antiquities as the Wrights' Flyers with their wing-warp controls, you will find this stick and rudder system on pretty much every aeroplane. If you watch your trusty flight simulation planes you can easily see the ailerons and elevators responding to your inputs, although the rudder action may be reversed to make it easier for you to control.

Drag and lift

The flaps on most aircraft are powered, and are controlled by a readily accessible switch on the panel or centre console. To set the flaps, either move the switch to the desired setting, or rock it forwards or backwards until the flap position indicator

shows that the flaps are where you want them and then let go. Some aircraft, such as the small Pipers, have a long lever between the front seats that looks very much like an old car handbrake. The lever is linked directly to the flaps, you pull it up and the flaps go down. There is a ratchet click at each stage of flaps, which prevents the lever dropping back down when you let go. There is a thumb button on the end of the lever to release the ratchet when retracting the flaps. Not every aeroplane has flaps, as you will doubtless have found out when trying to slow down the Walter Extra 300 for landing.

Some aircraft have slats that move in conjunction with the flaps. They move out from the front of the wing effectively creating a slot behind the front of the wing. On some slow aircraft these are permanent features and on some they are automatic. For example, the slats on a Tiger Moth are controlled by spring and air pressure, popping out when flying at low speeds.

Spoilers or air brakes are often fitted to both sleek and fast aircraft. Gliders and Mooneys have good examples of the types that can be seen popping up from the wings. Most commercial jets also have spoilers or air brakes, but of a different type. If you have ever had a seat next to the wing of an airliner you will have seen the top of the wing open up on landing. You may also have noticed them operating for roll control too.

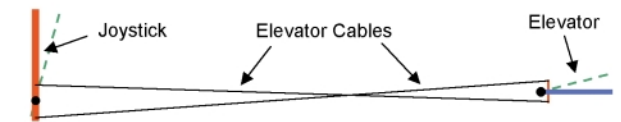
Closely scrutinise a real aircraft or even a well-built plastic model aircraft and you will notice that the moving elevators have what appear to be smaller elevators built into them. These are the trim tabs. On some planes you will find these trim tabs on the ailerons and rudder too.



A typical tail section showing the fin, rudder, stabilator and trim tab

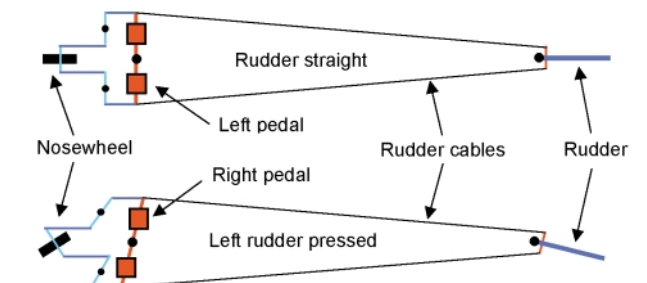
TYPICAL CONTROL SYSTEMS OF MAIN AIRCRAFT SURFACES

Elevator



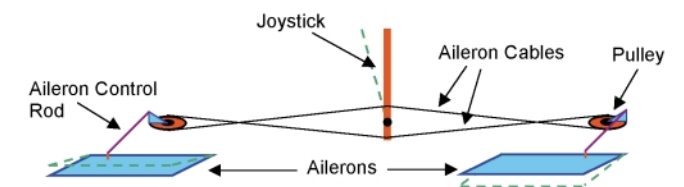
Joystick control of elevator - viewed from the port side. The dotted lines show how pulling the joystick back raises the elevator

Rudder



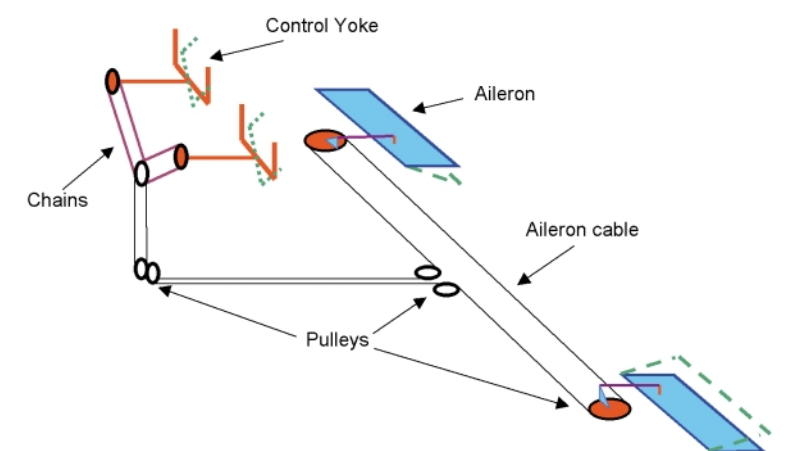
Foot pedal control of rudder and nosewheel steering viewed from above

Aileron



Joystick control of ailerons - viewed from the rear. The dotted lines show how joystick left moves the ailerons

Yoke



Yoke control of ailerons - viewed from port side. The dotted lines show how left yoke moves the ailerons

They are controlled by trim wheels, which are located between the pilots. There is typically one trim wheel for each axis, hence up to three per aeroplane, however on large aircraft there may be one elevator trim wheel for each pilot because it is used so much during a flight. The trim wheels move the trim tabs the opposite way to main controls, so winding the elevator trim wheel backwards moves the trim tab down. When there is air flowing over the elevator, pushing the trim tab down pushes the elevator up, which makes the nose go up. Hence the trim wheels work in the same sense as the main controls.

The Effects

So now we know what happens to the aerodynamic surfaces when the controls are moved, what is their effect on a plane flying through the air?

Most of you will know the ‘primary effects’ of controls and it all seems very straightforward until you realise that there are further effects that are not all that obvious. Most of these ‘further effects’, if left unchecked, result in the aeroplane heading rapidly towards terra firma. This is typically the first airborne lesson a trainee will have and it certainly gets the aspiring pilot used to seeing a lot of rapidly approaching green through the windscreen.

The Elevator

We’ll start with the elevator as this is the easy one. Pull back a little on the joystick and hold it there. The primary effect is that the

nose will pitch up. The further effect is a loss of airspeed. As the airspeed decays, assuming you haven’t pulled too hard, the elevators have less effect and the plane will stabilise at a new nose high pitch. If you try again and this time pull harder, the airspeed will decay more and you may stall, bringing a lot of green into your view. Hence the old flying instructors saying, "to go up - pull back; to go down - pull back harder".

Different airspeeds, power settings, flap positions, passenger weights, fuel loads, etc. alter the balance of the airplane. For stable flight, the elevator has to be in a different position and consequently so does the joystick. Unless the elevator is in its natural aerodynamic position, the pilot will have to continually work against the airflow to hold it there. This would be an impossible task for a long flight, and it is where the trimmers do their stuff. The pilot moves the elevator to hold the required pitch and then ‘trims out’ the control forces by turning the trim wheel in the cockpit. The joystick is not moved during this trimming procedure on a real aircraft, and once trimmed the pilot can let go and the joystick will stay where it is.

It is worth a mention here that controlling pitch on real aircraft during normal flight, landing and take-off is easy (knowing the correct pitch to select is the hard part). It is a shame that some flight simulators are quite erratic in pitch, with the nose bouncing around and difficult to control. The fight equations may be correct, but the feel of flying is not. Trimming the elevator on real aircraft is tricky, but soon learnt.

Some simulators are very difficult to trim for level flight and this is partly because the joystick centre position does not move. However, with force feedback joysticks available, future simulators should be able to mimic trim systems properly. If your PC/simulator combination behaves erratically in pitch, don’t be put off. It may not be just your lack of skill, but the unrealistic nature of the simulator. The only solution is to do everything very, very gently, practice and learn to live with it!

The Ailerons

Now we’ll move on to the ailerons. Push the stick gently to the right, but don’t pull back or touch the rudder. The aeroplane rolls to the right and things start to be more interesting, because the plane does not just roll to the right. Most planes will start to yaw to the right too, ultimately ending in a spiralling dive. More green in the windscreen. Not all planes behave quite this way, as some aircraft suffer from adverse yaw. What happens here is that the downward going aileron not only generates more lift, it also generates more drag. If this is more drag than is generated by the aerofoil that has moved upward on the other wing, there will be a turning moment yawing the aircraft the opposite direction to that expected. The net result is that you roll right but the nose swings off to the left. Adverse yaw is even more disconcerting if you have just taken off, a wing drops in a gust and if you try to pick it up by aileron alone the plane seems not to respond. This is where the rudder and slip indicator come in.

When the slip ball moves to the left, press the left rudder pedal to put the ball back in the centre, or “tread on the ball”. This will automatically compensate for adverse yaw. What’s more, turning some planes becomes easier if you press the rudder in anticipation, just before you move the stick.

The Rudder

The rudder is one of your primary flying controls; what’s more it is vital for some parts of flight. Push the left pedal and the primary effect is that the nose will yaw to the left. The further effect is that the right wing moves faster and because it is moving faster it gets more lift. More lift on the right wing and the corresponding less airspeed and lift on the left wing, results in a roll to the left. This effect can be so strong on some aircraft that the rudder can be as important as the ailerons for controlling roll, especially where there is a good degree of adverse yaw. What’s more, in a spin or a stall, when the wings have stopped flying properly, the rudder can be the only way to control roll. The other time that the rudder is critical is during the last few seconds of landing, when it is used to align the aircraft with the runway. This is particularly crucial in a crosswind, where the trick is to yaw the plane just before the wheels touch down.

If you use a joystick with a twisting rudder built in, you may find it easier to have the rudder controls reversed in your simulator. It is less realistic, but may prevent you becoming totally confused.

The Rest

Those are the main controls, however there are some other effects you should know about.

The engine has a number of effects on the aircraft that affect the handling. Increasing power raises the nose and reducing power lowers the nose. This is pretty handy because increasing power often means that you want to climb and reducing power is usually associated with descent. What’s more, the nose drops if the engine fails, thereby helping to prevent too rapid speed loss. A propeller also creates a corkscrewing slipstream over the airframe, which results in firm controls at higher powers and a small varying amount of roll. There are gyroscopic effects, which have the effect that raising the nose will yaw the plane and yawing the plane will raise or lower the nose. The directions depend on which way round the propeller rotates. These days it is most noticeable on tail-wheel aircraft during landing and takeoff, or during aerobatics, where it can be used to produce some amazing toppling manoeuvres.

In the days of rotary engines on aircraft like the Sopwith Camel, where all the cylinders (effectively the whole engine) rotated, the gyroscopic forces could make it far quicker to turn in one direction than the other. The result was that a Camel was extremely difficult (and dangerous) for the novice,



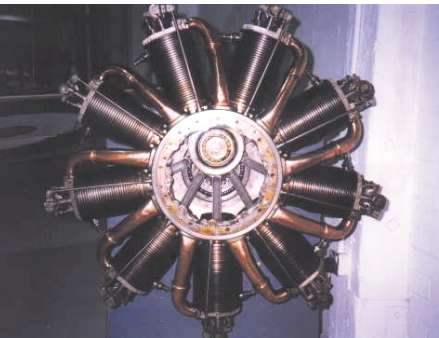
A close up of flaps and ailerons

but in the hands of an expert it could usually turn inside an enemy with deadly results.

This gyroscopic effect on aircraft should not be confused with the ‘P-factor’ that happens at high angles of attack, when the up going propeller blade moves less air than the down going blade on the other side of the spinner. The effect of ‘P-Factor’ is to pull the aeroplane to one side, again depending on which way round the engine rotates. It is most noticeable for tailwheel aircraft on the ground and during full power climbs at low speed.

The effect of deploying the flaps is to increase both lift and drag, whereas spoilers generally increase drag but reduce lift.

Spoilers are normally used at higher speeds as airbrakes. They can be used to reduce speed and altitude without having to reduce engine power too much, which could result in excessive engine cooling



A Sopwith Camel engine. Imagine the effect all this metal has on the handling when it spins round a thousand times a minute

and consequent damage. Flaps on the other hand have two main uses. Firstly they are used to allow slow flight by reducing the stall speed. Usually the first stage or two adds lots of lift but only a little drag. Their second use is to add loads of drag with little extra lift, and this is the function of the remaining stages. Drag is a handy thing to have during the final stages of approach. It allows easy control of speed without having to be excessively delicate with the elevator and throttle. It enables relatively high throttle settings, making aborting a landing easier, especially for gas turbines with their lengthy spool up times. Drag also means that your speed will decay rapidly when you close the throttle for touchdown, thereby preventing you floating merrily off the other end of the runway before your wheels finally touch the ground.

An understanding and operational knowledge of the effects of controls has to become intuitive. When flying, you will not have time to think about what does what. For example if you are flying a surveillance radar approach in IMC (instrument meteorological conditions) and the controller tells you to turn onto a new heading, you have to think the heading, interpret the instruments and let your subconscious push the joystick to roll the plane, whilst adding a little rudder and back pressure to hold your pitch. Don’t worry – it will all come naturally with practice and the advantage of flight simulators is that you can practice whenever you want.

Stephen Heyworth

SPEAK YOUR MIND

To buy or not to buy? A look at some of the after-market speakers for your PC — will they improve the reality of your sim or just upset the neighbours?

Cast your mind back to when they invented CD's. Conspiracy theorists would have us believe that this was a cunning marketing ploy to make you buy all your records over again. Most PCs these days come with speakers as standard, so is buying another set of speakers going to make any difference, or just a way of selling your hi-fi to you twice, like they did your records? To answer this conundrum we've assembled seven sets of speakers intended for operation with a PC. They all claim to improve on the original equipment and prices range from under fifty to over two hundred pounds.

Hearing is quite an important member of the five senses and accurate sounds are an integral part of the flight sim experience. Have a listen to some of Mike Hambly's sounds that we've included on the free CD and you'll get an idea of what we mean.

The game fraternity have known for years that a good sound system is essential to help immerse the player in a 'total gaming experience'. With simulated ATC, combat packages, different engine noises and a variety of other sounds, the flight

sim community can certainly benefit from an improvement in sound quality.

Music is another point to consider. Music? What's that got to do with my flight sim? Well, the vast majority of us have some sort of hi-fi system, normally located in the lounge of our flat or house. PCs often tend to be elsewhere in the abode and you need to decide if you want to turn your PC into an alternative sound system, or rely on the two small plastic boxes containing a transistor radio speaker from the early seventies that come as standard with most PCs.

Finally, you have to ask, is the sound card in your PC up to it? The latest sound cards come with the facility to run surround sound speaker systems at their full potential.

A well recorded sound file playing through a surround sound system can massively enhance a flight or a spot of combat, unless you live in a flat with very thin walls, when it can massively enhance the amount of aggravation you cause your neighbours!

All our tests were carried out with a Pentium III 500 PC, using a Sound Blaster

PCI Live! sound card. For sources we used the default sounds from Flight Simulator 2000, Combat Flight Simulator, some add-on packages (RAF 2000 and Tuskegee Fighters) and some custom aircraft sounds that you can find on the cover CD. We ran a number of the same flying or combat sequences through each set of speakers and compared them for clarity, realism, spatial effects and bass response. Our review team consisted of six volunteers, all flight simmers, one of whom was a hi-fi reviewer in a previous life.

Once we finished reviewing all seven sets of speakers we went to the door and collected an eviction notice from our landlord for causing a noise nuisance! On a serious note, remember that the power of some relatively innocuous looking PC speakers is equivalent to that used in public address systems only a few years ago. There's little point shelling out on a super speaker system if you can't use it anywhere near it's full potential. You'd probably be better off with a decent set of headphones, which is what Mike Hambly always recommends to anyone purchasing his sounds.

Derek Smalls

Yamaha YST-M40

The Yamaha YST-M40s were by far the most compact of the speaker systems we looked at and this will probably be their best selling point with a lot of purchasers. Not much bigger than most speakers supplied with PCs (about 10" high) and without a sub-woofer, the M40's have a reasonable 24W (12W RMS per channel) amplifier, outputs for headphones and an additional input for a music system. They can also be connected to a sub-woofer to beef up the



bass response, although Yamaha are confident that these speakers can cut it with the sub woofer boys using their YMERSION technology for surround sound and Advanced YST for better bass.

We didn't get too closely immersed (should that be 'ymersed?') in the acronym descriptions, but plugged them in to check out the sound. Traditionalists will tell you that for bass response, there's no substitute for a large speaker cone and a big box to put it in (check out any 10 year old hot hatchback cruising the streets with road-jarring bass and you won't find much in the boot apart from a 24" speaker).

Up to a point, the Yamahas prove this theory to be correct, as the surround sound effect is what you would expect from a decent compact stereo system but the bass certainly lacks depth and punch. Flying a Lancaster on full throttle or cranking up some Rolls Royce Olympus

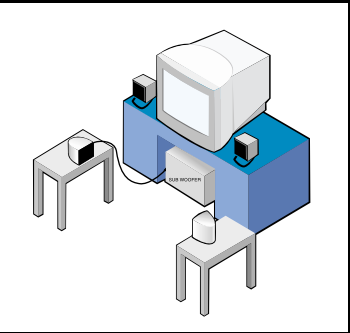
engines doesn't exactly make the rafters shake, but it must be said that the performance is far better than most speakers supplied as OE (original equipment) and if you aren't looking to break windows, they are good value.

The Yamahas are also quite stylish, come in white or black and have a superb large volume control on the front. We presume that the Yamaha designers (unlike some of their competitors) are aware that their customers use fingers to operate their equipment, not tweezers. Our only gripe was the separate power supply, which means yet more clutter around your mains sockets, but is a small price to pay for the compact size of these speakers.

REVIEW SCORE:			
Manufacturer:	Yamaha-Kemble Music UK	Cost:	£49.00
Website:	www.yamaha.co.uk	Colours:	White or black
Power output:	12W RMS per channel		
Pros:	Extremely compact units. Nice details like the volume control.	Cons:	Bass is not exactly incredible. The separate power supply is a nuisance.

"Where do you want me to stick these, guv'nor?"

With the exception of the Yamahas and the Spirits, all the systems reviewed here consist of a sub-woofer for reproducing deep bass notes and two or four satellite speakers for the rest of the sound range. Because bass sound is relatively non-directional (felt rather than heard) there is only one sub-woofer. These are not normally magnetically shielded so shouldn't be placed near monitors etc. The best place for them is usually on the floor, against a wall or in a corner. Wherever you locate it, make sure the speaker controls are accessible, as they are often fitted to the sub-woofer, which is fine, until they need adjusting. With a normal stereo system the satellite speakers should be placed on either side of the monitor. On a four-speaker system, the back speakers should be a foot or two behind you. Not always easy and you will often end up with a compromise, depending on the shape and size of your room. However, the diagram gives you an idea of what you should aim for.



Nicole SD322SA



The looks of the Nicole SD322SAs produced a mixed reaction from PC Pilot staff, ranging from "...a bit like a 1950's UFO.." to "... those ashtrays that get rid of the smell of smoke". Their styling is certainly something you'll either love or hate, but it must be said that the compact little satellite units (actually about the size of an ashtray) will fit very inconspicuously on your desk. However, there is also a sub woofer to be accommodated. Under the desk, on the floor, in a corner are all good locations, except that all the controls are on the back, which is a bit inconvenient. Assuming you can get at the sub-woofer, it has a volume controls, a 3D sound switch

and a simple tone control, which is probably it's main drawback. The balance between sub-woofer and satellite speakers can't be adjusted, so it's a bit all-or-nothing if you crank up the volume.

We weren't overly happy with the sound this system produced and it would certainly be improved if the sub-woofer volume could be controlled separately. This is especially true for those of you who have moved out of the baronial hall and into a studio flat. That said, the 3D option is pretty fair and the speakers coped quite happily with most of the flight sim sounds we threw at them. The sub-woofer certainly made the floorboards tingle when we flew some of the big stuff at full throttle but the satellite speakers began to sound stressed at high volumes.

A small minus point, which is true for many PC speakers, is that the cables for the satellite speakers were hard-wired into the units (with plugs to the sub-woofer/amp), so positioning them a fair distance from the sub woofer would require a bit of time spent with insulating tape and extra plugs. However, there is a useful input for other

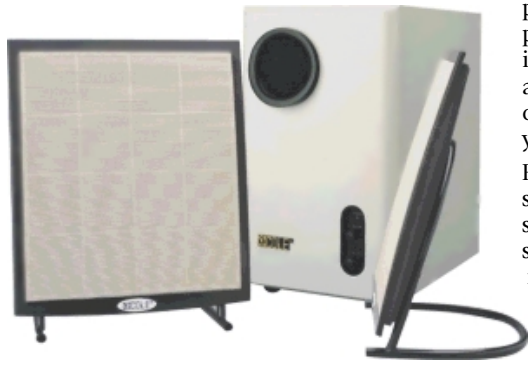
Nicole FP9903

After testing the Nicole SD322SAs, we were more than impressed with their popular flat panel relatives, the FP9903s. Initial observations were: good sound, nice styling and controls on the front of the sub-woofer/amp, which was very pleasing. Assuming these to be a more superior model, we were quite surprised when we checked the price to find that they were over £40.00 cheaper than their cone-shaped stable-mates.

It's true that the panels feel very flimsy and the drivers don't seem to be

particularly sophisticated, but the stereo separation was remarkable and we soon had a Spitfire roaring round the room and really sounding like it was covering some ground. The bass level on the sub-woofer can be adjusted on this model, which is a great advantage if you are flying quietly at night or you just don't fancy that rivet rattling bass.

A couple of minor gripes were that the input sockets were marked as such on the back of the sub-woofer/amp, but not the outputs. Reference to the 'manual' confirmed we were right, but these instructions were a very flimsy affair, consisting of a photocopied piece of A4 and diagrams that could easily pass for cro-magnon cave paintings. That said, the instructions are quite clear and apart from how to connect a pair of speakers, there isn't much more you need to say.



Flat panel speakers had a brief surge of interest in the 1970s, with some pretty horrific looking (and sounding) designs in polystyrene, meant for mounting behind picture frames. All very James Bond, but these types of designs have come a long way

audio sources and the whole system looks pretty well made. You can resolve the problem of adjusting the volume by setting it on the amp/sub-woofer and using the master volume on your PC, although should always be careful when doing this. It's quite easy to overload any system by putting too high an input level into it from the source. Early signs are distortion on low volumes.

Overall, the style of the Nicole's will either sell them to you or put you off right at the start. We liked the style (generally) but for £89.00 they are rather costly for what sounds like two cheap PC speakers partnered with a reasonable (but uncontrolled) sub-woofer.

REVIEW SCORE:			
Manufacturer:	Nicole Ltd.	Cost:	£89.00
Website:	www.nicole.co.uk	Colours:	White or black/gold
Power output:	No RMS figure quoted, estimated at 15W RMS per channel and 20W RMS for subwoofer		
Pros:	Style. Satellite speakers are very compact.	Cons:	Style. Sub-woofer can't be controlled separately.

and we think the Nicoles resolve the problem of speakers encroaching on your desk space in a novel manner. We've seen some criticism of the styling by other reviewers, but until PC manufacturers work out that most people's houses are not decorated in grey plastic (well done the iMac!) there's little point making speakers that are markedly different colours.

The satellite panel speakers have also got the facility to be wall mounted and they would certainly be of interest to anyone who is building a cockpit, as they can be hidden with ease. Our conclusions on the FP9903s were that they are far better value than their more expensive cousins and although the satellite speakers are not as good at high sound levels as some other (more expensive) offerings, they give a very creditable sound for the money.

REVIEW SCORE:			
Manufacturer:	Nicole Ltd.	Cost:	£48.00
Website:	www.nicole.co.uk	Colours:	White or black
Power output:	No RMS figure quoted, estimated at 15W RMS per channel and 20W RMS for subwoofer		
Pros:	Useful styling, bass can be adjusted and good value for money.	Cons:	Short leads. Satellite speakers are a bit flimsy.

Altec Lansing ACS 33

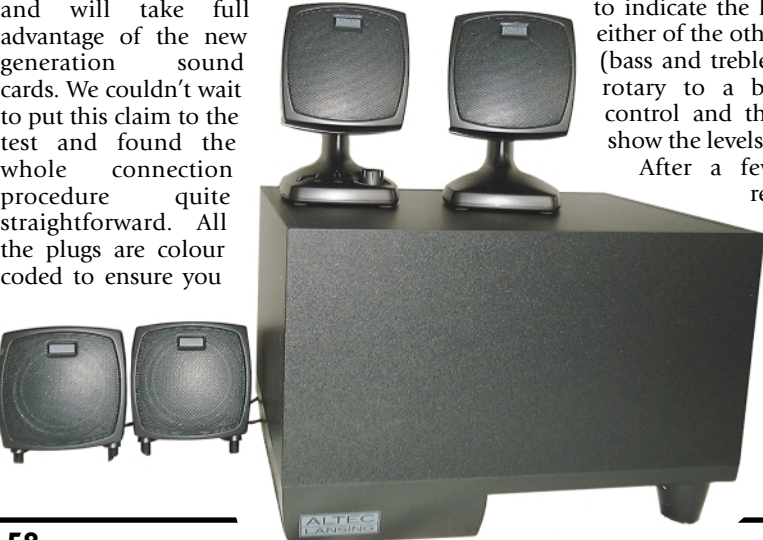
The fact that this Altec Lansing twin speaker plus sub-woofer system only kicks out 5W per channel on the satellite



Altec Lansing ACS56

The jump in price to the £100-plus region indicates that we are now entering the realms of serious kit. As well as a good sound system for your PC, this sort of equipment should also be capable of challenging compact hi-fi systems and the quality of sound should be easily apparent to an untutored ear.

In this respect the Altec ACS56's don't fail to disappoint. This is a very good quality 4-speaker surround system with sub-woofer that the makers boast is specifically designed for 'gaming' and will take full advantage of the new generation sound cards. We couldn't wait to put this claim to the test and found the whole connection procedure quite straightforward. All the plugs are colour coded to ensure you



speakers, shows just how deceptive power outputs can be. We were quite amazed by the quality (and level) of the sound produced by the two very dinky little satellite speakers. Unfortunately, this is another system where the sub-woofer cannot be controlled independently of the system. However, the balance between bass and satellites is extremely good and unless you need to cut the bass totally, it doesn't cause a massive problem. Part of the circuitry boosts bass at low volumes to maintain sound quality. You'll find a similar system on your hi-fi called the 'loudness' button. However, the difference with the Altec system is that it progressively reduces the 'loudness' as volume is increased.

The ACS 33s have a very nice feature in that all the controls, including power on/off are mounted on the base of one of the satellite speakers. This means you can place the sub-woofer/amp out of the way, forget about it and adjust the levels from your desk. The drawback to this is the very thick cable that carries the signals from one of the satellites to the sub-woofer. It's not a major problem, but it does make the satellite a bit unsteady and the cable is difficult to route tidily away.

connect everything up right and although it initially seems like a bomb has gone off in a wire factory, there is enough cable on each speaker to be able to tidy everything away fairly neatly. The rear speakers can be wall mounted, which is worth noting.

The control system is similar to the ACS33s, with one satellite having all the controls (although there's a rather fiddly mains switch on the back of the sub-woofer). This is a very trick system with three buttons and one rotary knob. One button switches between normal (stereo) and gaming (surround mode) with a corresponding light changing from amber to green to indicate the mode. The rotary knob is initially on/off and volume. As you turn it up an array of lights come on to indicate the levels. Pressing either of the other two buttons (bass and treble) converts the rotary to a bass or treble control and the lights again show the levels incrementally.

After a few seconds it reverts back to a volume control. It may sound a bit gimmicky but it's very useful in practice.

Once we'd understood the control

The sound quality was very good for a system that retails at under £50. You get a lot of electronics for your money and we thought the Altecs were worth the price for the position of the controls alone! However, they shaped up very well in all the tests, although a number of our reviewers remarked that they sounded a bit "woolly" (technical hi-fi buffs term for flat treble response). We couldn't really trace this to the source, as cockpit noises seemed very clear, but eventually tried a couple of music CDs in the interest of science and concluded that the ACS33s are quite sensitive about their location. Once you've got them in the optimum position relative to where you're sitting, they really sing and will certainly add to your flight sim realism for a modest price. Those with a penchant for fiddling with buttons will moan about a lack of treble and bass controls, but it does mean that the sound is probably more as nature (and the programmer) intended.

REVIEW SCORE:			
Manufacturer:	Altec Lansing	Cost:	£48.00
Website:	www.altecomm.com	Colours:	White or black
Power output:	5W RMS per channel (satellites), 15W RMS (sub-woofer)		
Pros:	Can be fully controlled from the satellite. Good balance between sub-woofer and satellites.	Cons:	Huge cable to one of the satellite speakers is a nuisance.

procedure (always best to have a fiddle and then read the instructions) we were ready for some sound trials. To be honest, if you were blindfolded you would swear that these speakers were about four feet tall instead of a mere four inches. The surround-sound capability with a Sound Blaster Platinum card was excellent. Like, the ACS33s, position is everything and these speakers need to be situated as shown in our diagram to get the best out of them. That said, the power output is staggering and the units themselves must be very efficient to deliver such high noise levels. A quick push on the throttles in all our test machines gave a reassuring roar that was all the more realistic because you can't pinpoint the source unlike a normal speaker, the surround system adding to the illusion.

Overall, a very impressive system and all the better for the neat and compact styling. In case you were wondering, yes, we did manage to light up all the lights on the volume display and although the speakers didn't sound overly stressed, our reviewers soon did.

REVIEW SCORE:			
Manufacturer:	Altec Lansing	Cost:	£105.00
Website:	www.altecomm.com	Colours:	White or black
Power output:	35W RMS		
Pros:	Brilliant sound, very compact and a superb set of controls.	Cons:	Only worth the money if you want serious sound.

VideoLogic Sirocco Spirit



Unpack a pair of Sirocco Spirit speakers and you are aware that you have entered hi-fi territory and are about as far away from grotty little grey plastic PC speakers as it's possible to get. The units are made in solid-feeling MDF, finished in black (no other colours), have detachable grilles and stand about 11" high. They work on a conventional (in hi-fi terms) bass reflex design, which means that low frequencies are handled by a larger driver that pumps air through a tube in the baffle (the board

it's mounted on) to get as much air moving as possible so no bulky sub-woofers needed. These speakers resemble the sort of monitor units you would find in most recording studios, apart from the built in amplifier that gets the sound from your PC up to an acceptable level.

The controls are all situated at the back of one of the units, which means a tidy look but fiddly adjustment. They might resemble bookshelf speakers, but don't put them on a bookshelf if you want to adjust them! The difference between the Spirits and other PC speakers is soon apparent from the inputs. They have separate sockets for high or low level inputs – high for a PC and low for a CD player or other audio source. The two drive units in each speaker (bass and treble) are made by Audax, a well-known name in the hi-fi world. The Spirits use a very advanced system to split sound between bass and treble. Most speaker systems use a filter to cut out bass to the treble units and vice versa. The Spirits have two amplifiers on each channel to power the drivers separately. This active filtering system greatly improves sound quality and is normally only found on high end audio equipment. The tone is handled by the 'attitude' control that varies power to the individual drivers, but we found the best results came from leaving it flat.

Once we'd gone through the simple process of connecting up the Spirits, we sat back and enjoyed some of the best sounds ever to come out of a PC. It's true that these speakers are pretty expensive, but they are reasonably priced when compared to budget hi-fi speakers. If you use your PC to listen to music as well as flying your favourite aircraft, then these are the units for you. Even the most basic default sounds in Flight Simulator 2000 have a new clarity and turning up the volume only serves to make these speakers sound better (as well as louder!). Having said that, a good surround system like the Altec ACS 56s could give them a run for their money and with the added bonus of four-speaker surround sound. However, these speakers offer a genuine hi-fi sound at a reasonable price. You could get the same effect by hooking your PC up to a decent hi-fi system, but to get this sort of quality you'd need a big desk to put it on.

REVIEW SCORE:			
Manufacturer:	VideoLogic Systems	Cost:	£139.99
Website:	www.videologic.com	Colours:	Black
Power output:	50W RMS per channel		
Pros:	Excellent sound quality – a true hi-fi speaker.	Cons:	Large cabinets and all controls at the back.

VideoLogic Sirocco Crossfire

"How much?!" was the general response when we looked at the publicity information that came with this system and saw 'Price: £234.99'. However, we noted that the Sirocco Crossfire came in a huge box and we were prepared to be amazed. Although described as 'the ultimate 3D system for serious gamers' the Crossfire has its roots firmly in the professional studio equipment camp. The system consists of four twin-driver satellite speakers (about 4" high), with a large sub-woofer and a



separate amplifier and control unit. This latter item is wonderfully finished and immediately says 'high quality professional kit' the moment you see it.

Connecting up the speakers was quite simple and the amplifier has inputs for either stereo or surround sound cards. All the plugs are gold plated and the whole system oozes superiority. Even the small satellite units have detachable grilles. It's what you would expect, given the price, but we were still impressed with the quality. The control system can be run in either 4-way sound or dual stereo mode and even with a normal stereo source, these are unlikely to disappoint.

Most of our other sound tests took us a few hours per system and it's a mark of the impression these speakers made that we were still using them a week later. Tears were shed when they had to go back in the box. The sound is awesome from these compact units and with a decent 3-D source it's as good as being there. Sit in the cockpit, ease up the volume with the solidly made control, open the throttles

and bask in the sound of four Merlins at full chat or eight Pratt & Whitney TF33 turbofans on their way to the Mekong Delta. Charlie might not be surfing, but he

could certainly hear you coming with these speakers. There is a clarity and depth to the engines and other noises that you won't find anywhere else. Don't test drive these or listen to them on a friends' PC, unless you've got your money ready. You'll probably want a pair straight away.

A system like this can only be justified if you're going to use it for music as well and we tried a few audio CDs to see if the sound was as good as the hype. The answer is yes. All the various combinations of music (including solo piano, which is notoriously difficult for speakers) sounded excellent. If it's time you replaced an ageing hi-fi, you could do worse than buy a Crossfire system and run all your audio from your PC. So, if you've got the money, these are the probably the best speakers you'll get for a PC before you enter audiophile territory and it's worth bearing in mind that they're less than the price of some graphics cards. However, if all you want them for is the flight sim on your PC, they may take a bit of justifying to the financial controller. The neighbour annoyance quota of this 100-watt system is as high as you can get, so they are only recommended for detached properties or users with great self-control.

REVIEW SCORE:			
Manufacturer:	VideoLogic Systems	Cost:	£234.99
Website:	www.videologic.com	Colours:	Black
Power output:	100W RMS		
Pros:	State of the art sound quality. A separate, beautifully made amplifier	Cons:	Price, unless you have long pockets or use your PC as a hi-fi.

A GRAPHIC DESCRIPTION



Everyone's talking about the new Voodoo 5 5500 from 3dfx, but is there enough voodoo magic to justify the fat end of £250?



FEATURES SUMMARY

Impressive, nay, awesome specifications are attached to the Voodoo 5. Here's a brief look:

256-bit 2D/3D accelerator (this is correct, although the retail box claims 128-bit)

64Mb of graphics memory

Twin VSA-100 chips

166MHz core/memory clock

32-bit colour rendering

Real-time full scene hardware anti-aliasing

T-Buffer™ digital cinematic effects

350MHz RAMDAC

4X AGP with full sideband support

The minimum PC recommended by 3dfx is a PII 233MHz with AGP slot.

How much? To you sir, £249.00 or thereabouts.

If someone said to you "Voodoo scalable architecture, full-scene anti-aliasing, T-Buffer technology, scan-line interleave..." you might well be suitably impressed, or possibly bewildered. Translated from the original techno speak, these are but a few of the features of the current generation of video cards from 3dfx, the company that brought us Voodoo Graphics, Voodoo 2, Banshee, and the Voodoo 3. Their latest creation, based on the VSA-100 chipset, is a commitment from the crew at 3dfx to improve the image quality of any 3D application. To test their claims we got our hands on a new Voodoo 5 5500 AGP board and couldn't wait to experiment with the much-publicised FSAA (full scene anti-aliasing). What is FSAA, you ask? Stay with us for the details, but suffice to say that it's an image quality enhancer for all your 3D programs. With such a weighty preamble, our hardware team couldn't wait to get out the microscope and scrutinize the latest Voodoo magic.

The unveiling ceremony

Sliding the board out of the flaming orange box, the sheer size of this graphics card is mind-boggling. Is it a motherboard or a graphics card? OK, that's stretching it a bit, but it is enormous. The PCB (printed circuit board) is 245mm long (compared to 170mm for a Matrox G400 MAX) and we wondered for a moment if it would fit our mid-tower ATX case.

Another curious and interesting thing that immediately becomes apparent is the power connector. This beast needs a direct feed of voltage from your power supply.

Why? It seems that the AGP bus voltage on many motherboards is insufficient for today's display adapters. This can create a variety of problems, as we saw with many GeForce cards last year. 3dfx took no chances here, as the board will not function without plugging in the supplied 4-pin connector.

The supplied software extras include 3Deep and True Internet Colour, both programs geared around fine-tuning the gamma and colour of your video card and monitor.

Installation

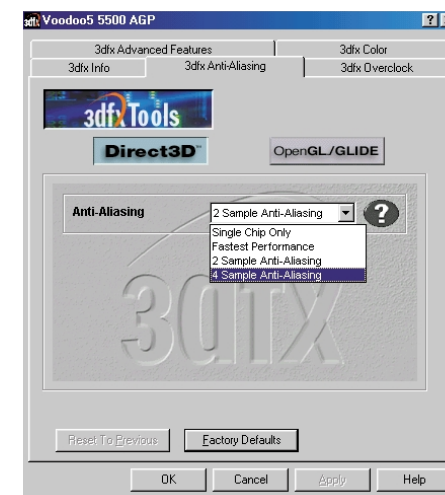
We encountered absolutely no problems installing the Voodoo 5, although smaller mini-ATX towers may be short of space to house this card, so put your tape measure to use before purchasing. The manual, which we followed step by step, is direct, well written and easily understood (always read the manual before installing any hardware!).

Within ten minutes the drivers and 3dfx Tools application were installed. We were delighted to see what is perhaps the clearest, sharpest 2D display yet, even surpassing the renowned Matrox G400.

Do you use an alias?

The Voodoo 5 5500 AGP was built with one goal in mind - to greatly improve the visual quality of 3D applications with a minimum loss in performance. The technique or tool as they say, is FSAA (full scene anti-aliasing). Apart from the use of false names so beloved of villains, aliasing is defined as the undesirable

jagged or stair-stepped appearance of diagonal lines in computer-generated images or undesirable visual artefacts,



The Voodoo 5 hub, from where you can select FSAA

such as 'popping' polygons. It is caused by under sampling, as a result of memory and bandwidth restrictions. It follows on quite neatly, therefore, that anti-aliasing is the removal or reduction of stair-stepped distortions and this is accomplished by filling in the jagged edges with grey or colour.

No doubt you are all very familiar with jagged edges and shimmering, popping polygons in flight simulation. Flight simmers, it's time to rejoice because 3dfx have answered our prayers (well, almost). Integrated into your desktop taskbar after installation is the 3dfx hub, which allows you to select three levels of hardware driven anti-aliasing (AA from here on). These are fastest performance (no AA), 2-sample AA (medium), and 4-sample AA (best image, biggest performance hit). It's simply a matter of mouse clicking the icon and then you can make your selection,

minimize it and launch your favourite program, with no reboot required.

A sight for sore eyes

The improvement in visual quality is sometimes dramatic, sometimes subtle, but always noticeable. Combat Flight Simulator showed obvious improvements, as the T-Buffer filled in the glaring seams and smoothed out the ridgelines in the mountain scenery. All of the aircraft visuals improved wonderfully, as the screen shots below indicate.

Flight Simulator 2000

We are very disappointed to report that FSAA does not function (yet) in either Flight Simulator 98 or 2000. 3dfx's Bubba Wolford has informed PC Pilot of a driver issue that is being addressed, and is very confident it will be made functional. In

The wonders of FSAA in two different sims

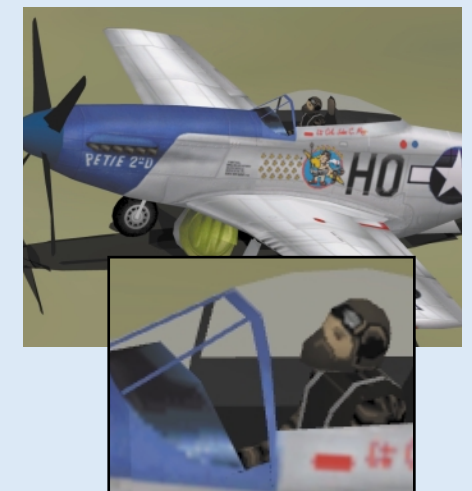
Take a look at these screenshots from Combat Flight Simulator and Falcon 4. You can just about see how the progressive levels of anti-aliasing improves the quality. It's not quite as obvious with the full screens unfortunately. The effect is quite easy to spot on the tail from Falcon 4 and you can just make it out in the cockpit frame of the P-51.



No FSAA and jagged edges



Smoother edges with 2-sample



Much less jagged with 4-sample

Falcon 4 is also looks terrific. Check out the differences:



No FSAA and jagged edges



Smoother edges with 2-sample



Much improved tail with 4-sample

the meantime there are a number of simulations FSAA does work with, including Fly!, Combat Flight Simulator, Jane's F/A-18, Flight Unlimited II and III and Falcon 4 to name but a few. In fact, 3dfx claims the only 3D programs where it doesn't work are Flight Simulator 98 and 2000. Now that is torture!

Performance

It should be no surprise that improvements to image quality like this come at a price. Enabling the 4-sample anti-aliasing reduced frame rates in Combat Flight Simulator by as much as 50%. However, the game was running at 80 to 90 frames per second prior to the 4-sample switch, so the loss was barely noticeable. 2-sample AA looked nearly as sweet as 4-sample, with essentially no performance penalty. Falcon 4 looked superb in 4-sample with completely fluid graphics as well. We tried 4-sample on a 'phantom' 3D game (not a simulation) with choppy, slide show results. The point of this was to show that each application would respond a bit differently when anti-aliasing is engaged.

Now let's take a look at how the Voodoo 5 measures up to two of our favourite boards, the Creative TNT2 Ultra and the Matrox G400 MAX. Using Flight Simulator 2000 as our measuring platform (remember, it's only the FSAA that doesn't work with Flight Simulator), does the Voodoo 5 offer any performance boosts?

550MHZ PROCESSOR			
TEST FLIGHT LOCATION Frames Per Second	3dfx VODOO 5 Frames Per Second	MATROX G400 MAX Frames Per Second	CREATIVE LABS TNT2 ULTRA Frames Per Second
London	18.8	18.2	18.3
Meigs Default (Cockpit)	20.2	20.0	20.1
Meigs Default (Spot View)	19.3	15.8	16.1

733MHZ PROCESSOR			
TEST FLIGHT LOCATION Frames Per Second	3dfx VODOO 5 Frames Per Second	MATROX G400 MAX Frames Per Second	CREATIVE LABS TNT2 ULTRA Frames Per Second
London	23.8	22.5	22.7
Meigs Default (Cockpit)	24.3	23.7	24.3
Meigs Default (Spot View)	22.7	17.6	18.6

Test system:

Pentium III 550 and 733MHz

Abit BH6 (550) and Abit VT6X4 (733) motherboards

128Mb Enhanced Memory
Systems PC133 SDRAM

1280 x 1024 x 16 resolution

The Voodoo 5 certainly offers better performance, especially evident in spot plane views. It would also appear that the gap might widen as CPU speed increases (though we would have to test this theory). Overall, the board was completely stable, accepted over-clocked AGP bus speeds with no complaints and provided excellent graphics in Flight Simulator 2000, even without the fabled anti-aliasing.

Is it worth it?

3dfx have brought to the table an excellent graphics card with innovative features and typical 3dfx performance and stability. As is so common with hardware upgrades,

the looming question is whether or not it is worth its weight in cash. Here's our best take on this dilemma. If you are currently using a video card from a few generations ago (TNT, Voodoo 2, Banshee) and you are willing to shell out some serious money, then this card will not disappoint you. If you are lured by the temptation of ever more beautifully rendered aircraft and scenery, then the Voodoo 5 5500 AGP could also be your ticket. However, the biggest disappointment with the card (at the time of writing) is the lack of FSAA functionality in Flight Simulator 2000.

Taking into consideration all the arguments for and against, one might be better off waiting for driver revisions and price reductions before going for another upgrade just to improve the frame rate. The new GeForce card and the KYRO from ST are likely to widen the choice even further (look out for more reviews when new drivers come out), but then again, let's not forget the other simulations that are ready and waiting to take full advantage of FSAA, which is where the Voodoo scores.

Greg Gott

REVIEW SCORE: 			
Manufacturer:	3dfx	Cost:	£249.00
Website:	www.3dfx.com	Release Date:	Out Now
Pros:	Can improve frame rates if your PC is fast enough.		
Cons:	Expensive and lots of competition at the moment.		

THE ONLY HUB FOR VIRTUAL AIRLINES

Our search goes on for the world's best virtual airlines. In this issue we feature WestWind, a VA famous for it's rigorous schedules



WestWind virtual airline is a long established outfit that was created way back in 1996 by Hal Groce, Sean Reilly, Richard Beasley and Gary Madore. The airline was an immediate success and was described as 'the best Virtual Airline on the net'. Fifty of their original pilots are still flying for the airline.

The active pilot roster now stands at 563 and they have room for an additional 587 pilots in their hubs. Their active pilots have flown almost 250,000 hours with an average of 444 WestWind logged hours per pilot. Over 5,000 pilots have gone through WestWind, with some continuing to fly for other airlines and a lot who

found it too rigorous. People join WestWind for various reasons, but chiefly for the opportunity to learn and experience the professional skills needed in civil aviation. Their infrastructure is specifically built to achieve that goal.

WestWind have established 23 hubs to build teams of roughly 50 pilots. Experienced hub managers (over 300 hours) are there to help pilots learn, motivate them to continue building their skills and provide help. Hub managers have wide authority to manage their hubs in the best interest of the pilots. Until the hubs reach their full quota of 1,150 pilots, no new ones will be built.

WestWind sounds like a great platform for learning the professional aspects of aviation. The hours logged by WestWind crews are pretty impressive. Some 67 pilots have logged over 1,000 hours, 11 over 2,000 hours, five have over 3,000 hours and one an incredible 4,000 hours. If you fancy a challenge, then this is the VA for you.

Derek Smalls

CONTACT DETAILS

Gene Popma, President/CEO
genepop@earthlink.net

Website: www.flywestwind.com

AIRLINES AROUND THE GLOBE

JERSEY EUROLINK GROUP

A VA group that includes Jersey Euro Link, Jersey Cargo Link, Jersey Sun and is described as being "based more on fun and freedom than on regulations".
WEB: <http://members.tripod.co.uk/jeurolink>

BAHAMASAIR VA

Offers world-wide destinations in addition to extensive services in south eastern United States, Bahamas and surrounding islands.
WEB: <http://cybermoo.net/bahamasair>

KTEAM FLYING GROUP

Not strictly a VA, but a flying team that go to fly-ins and tournaments with their aerobatics group. Well worth a visit if you can keep your lunch where it belongs when you're pulling 6G.
WEB: www.kteam.homestead.com/KTEAM.html

EASTERN VIRTUAL AIRLINES

A VA that's been up and running since August last year and that now boasts over 300 pilots in their ranks, Eastern VA have real 757 and 767 pilots available to answer questions.
WEB: www.evair.com/index.htm

BRITISH AIRWAYS VIRTUAL

British Airways Virtual started life just over two months ago with the aim to make flying with a virtual airline both a rewarding and enjoyable experience.
WEB: www.bavirtual.co.uk

TEXAS AIR CARGO

Texas Air Cargo operates out of the new Austin/Bergstrom International Airport at Austin, Texas.
WEB: www.geocities.com/texas_air_cargo/

VIRTUAL BRITISH CALEDONIAN AIRWAYS

VBCA is a virtual airline that is targeted towards the UK and European flight simmer.
WEB: <http://avsim.com/hangar/air/vbca/index.html>

POLAR AIR VIRTUAL AIRLINE. POLAR AIRWAYS

HUB based at Amsterdam Schiphol Airport (EHAM) and with offices in Almere the Netherlands.
WEB: www.polarairways.com/

VIRTUAL DELTA AIRLINES

This site is primarily for the aviation enthusiast interested in airline operations, especially Delta airlines.
WEB: <http://virtualdelta.cjb.net/>

AIRKENT UK

AirKent is a VA from London. Currently operating the Airbus A320 family and BAe 146s from its main hub, Gatwick South Terminal.
WEB: www.airkentuk.co.uk/

VIRTUAL AIR COMMAND

Models itself on the real world US Air Force Air Mobility Command. Here you can fly all the big USAF heavies.
WEB: www.geocities.com/CapeCanaveral/Campus/6174/

VIRGIN SUN

Based at Birmingham International Airport, they operate from there as well as from London-Gatwick. They operate on flights to and from sunspots around the Globe.
WEB: <http://members.aol.com/Afre63456/vvs/>

SUN CHARTER INTERNATIONAL

This is a new airline operating from the merger between BAC and SLL, within the UK to European resorts and across the Atlantic.
WEB: http://sun_leisure.homestead.com/index.html

MANCHESTER AIRWAYS VA

Manchester Airways is one of the UK's newest generation of virtual airlines. With its extensive UK network operating out of Ringway (Manchester).
WEB: www.wayne11.freemove.co.uk/man/man.htm

60th HELICOPTER SUPPORT UNIT

A military style outfit that flies choppers in combat roles.
WEB: www.geocities.com/60thvaw/60thhsu/index.html

AIR JET UK

This airline offers you a gateway to virtual airline flying.
WEB: www.flightsimnetwork.com/airjet/

EASYJET

Based at London Luton airport in the UK, and has over 15 destinations to fly to.
WEB: www.geocities.com/easyjet_va

EXCEL AIR

Serving Milwaukee, Daytona, San Diego, Denver, Dallas/Ft. Worth, Los Angeles, Atlanta, Boston, Washington DC (DCA), Minneapolis St. Paul, and Phoenix.
WEB: <http://ourworld.cs.com/FlyExcelAir>

VIRTUAL 2000

Currently they fly to more than 90 destinations in Europe. UK-based.
WEB: <http://va2000.homepage.com/>

SOUTH EASTERN AIRLINES

Opened on 14 March 1999 and is based out of Hartsfield International Airport in Atlanta, Georgia.
WEB: <http://free.prohosting.com/~se-air/>

ICELAND AIR

They fly to most of the major airports on the US East Coast, Canada, and Europe using real world routes, time tables and of course the correct fleet of aircraft
WEB: <http://icelandair.tripod.com/>

ALASKA VIRTUAL AIRLINES

Based on the real world airline, Alaska Virtual Airlines and Horizon Virtual Airlines have one of the most realistic flight schedules found on the Internet utilising comprehensive flight schedules.
WEB: http://alaska_va.tripod.com/

AIR LINGUS

This airline is based on the real Air Lingus airline. A must for Irish VA participants.
WEB: <http://aer-avensis.hypermart.net/main.htm>

KNIGHT AIR

This VA has three hubs in the UK and an extensive worldwide route network. They come highly recommended by their members.
WEB: www.knightair.org

If you have a virtual airline that is not listed here, then please feel free to send in a short description to mail@pcpilot.net where we will endeavour to include it in a future issue.

Product Listings

A comprehensive round up showing some of our favourites from the many great products we've reviewed at PC Pilot. Where products are listed as requiring 'FS2000' this means the products are designed and adapted to run with Flight Simulator 2000 without any problems or bugs. As always, if in doubt check with the supplier or publisher before purchase to clarify any concerns.

CIVIL SIMS



Elite 6.0
Undoubtedly the best IFR procedural trainer there is. So it should be, the frightening price will put off all but the truly serious - the full kit can cost £695.

Initiative Computing £249.95
www.flyelite.com
Featured: Issue 4



Flight Simulator 2000
Despite much publicised criticism over poor frame rates and misleading PC requirements, this still seems to be the benchmark sim. An awful lot of sim for the money, but invest in a decent PC before buying.

Microsoft £49.99/£69.99
www.microsoft.com
Featured: Issue 2



Flight Unlimited III
Perhaps the most engrossing sim available with wonderful weather, scenery, ATC and flight models. Shame it is just so very limited in its available flying area.

Electronic Arts £39.99
www.flight3.com
Featured: Issue 2



Hangsim
Fabulous graphics and the only sim to really provide a decent simulation of non-powered craft and microlights. It even has James Bond-style rockets. But if you are not into flimsy wings and lawnmower engines, you may find it limited.

Just Flight £34.99
www.justflight.com
Featured: Issue 1



Airline Simulator 2
Perhaps the best airline flight modelling around with accurate procedures (it's been designed by real airline pilots over many years). Unfortunately not for the faint of heart - old DOS interface and daunting controls a real put-off. Expensive too.

Just Flight £99.99
www.justflight.com
Featured: Issue 1



Airport Inc.
Take a rest from flying and show BAA how they should really run Heathrow. Fun, yet ultimately limited airport management game.

Take 2 £29.99
www.take2games.com
Featured: Issue 4



FlitePro
Offers a wide range of training features for the IFR pilot, yet reasonably affordable. Low frame rate for instruments detracts from its overall appeal.

Jeppesen £99.99
www.flitepro.com
Featured: Issue 4



Fly!
Overshadowed by Microsoft's mighty sim, Fly! has gathered a loyal following. Thought to be better than its rival and some excellent add-ons (and patches) enhance the appeal from when we originally rated it. Available at less than £10 in some stores so a true bargain!

Take 2 £39.99
www.iflytri.com
Featured: Issue 1



COMBAT



Enemy Engaged: Comanche vs. Hoku
Strikes the balance between gameplay and realism perfectly. Ideal for both rocket junkies or rotorcraft rookies alike. Only downside is no single mission mode and it's not as pretty as Gunship.

Empire £29.99
www.enemyengaged.com
Featured: Issue 5



Tuskegee Fighters
Beautifully designed aircraft and excellent scenery. The great missions add the final touch of genius. One for any CFS fan's must-buy list!

Abacus £29.99
Requirements: CFS
www.abacuspublisher.com
Featured: Issue 5



Flanker 2.0
Excellent, with great detail. This is one of the few combat packages that is worth calling a simulation. Online fan base will prolong longevity and interest.

Mindscape £34.99
www.ssionline.com
Featured: Issue 2



Janes F/A 18
Technically complex with masses of detail and lots of options. Mission builder is nice. Downside is that it is technically complex and you need a high-spec PC.

Electronic Arts £39.99
www.janes.ea.com
Featured: Issue 5



Janes USAF
Massive potential with formidable collection of aircraft simulated. Pretty graphics and pretty well done, though lacks details purists might seek.

Electronic Arts £39.99
www.janes.ea.com
Featured: Issue 3



Pacific Combat Pilot
Great aircraft with nice details, picturesque scenery and challenging missions. Blocky aircraft textures and strange German voices on the radio are its only drawbacks.

Just Flight £24.99
Requirements: CFS
www.justflight.com
Featured: Issue 3



F/A 18 Super Hornet
Unsurpassed carrier operations and silky smooth flight model appeal. Unfortunately only forty missions and the basic scenery detract.

Titus £34.99
www.superhornet.com
Featured: Issue 3



Gunship
Jaw dropping graphics and a neat gunner's position mode do not make up for the flawed gameplay and restrictive campaigns. Annoying bugs and features also put us off.

Microprose £34.99
www.gunship.com
Featured: Issue 5



Wings Over China
Interesting expansion for CFS with great Himalayan scenery. Good value, but some bugs can cause problems.

Abacus £24.99
Requirements: CFS
www.abacuspublisher.com
Featured: Issue 3

SCENERY AND AIRCRAFT



FS Traffic
Perhaps the best £20 you can spend enhancing Flight Simulator - it really does bring airports to life. Now in boxed and download flavours.

Just Flight £19.99
Requirements: FS98/2000
www.justflight.com
Featured: Issue 2



Luftwaffe Collection
Oozes authenticity and packed with an eclectic, yet perfectly detailed, collection of aircraft. Some CFS niggles (such as no Quick Combat set-up for the aircraft) only downside.

Just Flight £24.99
Requirements: FS98/2000 or CFS
www.justflight.com
Featured: Issue 1



Airport 2000 Volume 2
Incredibly detailed renditions of major airports with decent aircraft and adventures. Sadly a frame-rate hog in both FS98 and 2000 and adventures are complex.

Just Flight £29.99
Requirements: FS98/2000
www.justflight.com
Featured: Issue 4



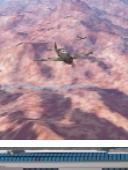
Austria Professional
Accurate and beautiful scenery with lots of nice charts, but only if you have Flight Simulator 98. Make the hills come alive with more than music.

Papa Tango £29.95
Requirements: FS98
www.papatango.com
Featured: Issue 3



German Airports 3
Wonderful enhancement for those interested in flying to the Fatherland. Like all beautiful things though, can drain system resources alarmingly.

Aerosoft £24.99
Requirements: FS98/2000
www.aerosoft.com
Featured: Issue 4



Grand Canyon
Breathtaking graphics from the developers of Airport 2000, with lots of new aircraft and adventures. Fun to explore, but ultimately limited area and poor frame rates.

Just Flight £24.99
Requirements: FS98/2000 or CFS
www.justflight.com
Featured: Issue 1



Mad Dog
Currently only for FS98, this is a hell of a package with aircraft and both beginner and professional panels of the MD-80 series of aircraft. Old style plane visuals and hefty price-tag

Lago £34.99
Requirements: FS98
www.lagoononline.com
Featured: Issue 1



Private Wings
A quality collection that all virtual pilots interested in light aviation should consider. Only downside is some aircraft do not feature transparent canopies.

Data Becker £19.99
Requirements: FS98/2000
www.databecker.com
Featured: Issue 5



Royal Air Force 2000
Eclectic, yet balanced, mix of aircraft with excellent panels and bonus of missions for CFS users. A few clumsy details on some of the aircraft are the only downers.

Just Flight £24.99
Requirements: FS98/2000 or CFS
www.justflight.com
Featured: Issue 4



X-Plane X-Pansion
Brings the versatility of Microsoft's sim to X-Plane with plenty of new aircraft and scenery. Only works with certain versions of X-Plane, so check carefully before purchase.

Wilco £24.99
Requirements: X-Plane
www.wilcopub.com
Featured: Issue 1

HARDWARE



AFCS II Yoke
Heavy metal control, hand crafted and definitely the Aston Martin of controllers. Eye-watering price to match though.

AETI £400.00
www.simpilot.com
Featured: Issue 3



AMD Athlon 550 MHz Processor
If you are thinking of upgrading your processor, then the Athlon is the one we'd choose for the best flight sim set-up.

AMD approx £100.00
www.amd.com
Featured: Issue 5



Cirrus Pedals
Unsurpassed quality, these certainly deliver the goods. But at a price - do you really want to spend £250?

AETI £250.00
www.simpilot.com
Featured: Issue 3



Flight Sim Yoke PC
Good value and deservedly popular, though throttle is rather delicate in feel and quality is not as good as CH would claim.

CH Products £89.95
www.chproducts.com
Featured: Issue 3



G400 Dual-Head
One of our favourite cards. 32Mb with nice twin monitor support. Fast, smooth and great value.

Matrox £150.00
www.matrox.com
Featured: Issue 4

OTHER PROGRAMS



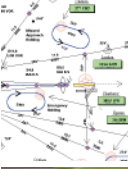
SimCharts
Genuine Jeppesen airport charts (to all intents and purposes) at a bargain price. But they're on the CD and you need a decent printer. Treat yourself to the expensive pack and get printed en-route charts too.

Jeppesen £19.99/£29.99
www.jeppesenpcpilot.com
Featured: Issue 2



Aircraft Animator
Easy to use and delivers excellent results quickly. Only if you are a keen fiddler should you really splash out as most aircraft come ready-animated now.

Abacus £34.95
Requirements: FS98/2000 or CFS
www.abacuspublisher.com
Featured: Issue 2



Final Approach
Good value package that not only solves the mystery of IFR approaches, but also provides fistfuls of airport plates too. Not for the casual flyer though.

Just Flight £24.99
www.justflight.com
Featured: Issue 5



FS Design Studio Pro
A great package for designing scenery and aircraft. While relatively easy to use it can be tricky to place scenery accurately when you've finished being creative.

Abacus £39.99/£59.99
Requirements: FS2000
www.abacuspublisher.com
Featured: Issue 5



R.C. Simulations
The Hangars, Bristol International Airport,
Lulsgate, Bristol, BS48 3EP, United Kingdom.
Tel: 0044 (0)1275 474550 Fax: 0044 (0)1275 474855
Email: sales@rcsimulations.com

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Glossary

The world of aviation seems blessed with a bewildering array of acronyms. We hope the following will prove a handy reference guide to some of the more widely used terms.

A

ACARS - Aircraft Communication Addressing and Reporting System
ADF - Automatic Direction Finder/Finding
ADI - Attitude Deviation Indicator
ADR - Accident Data Recorder
AFCs - Automatic Flight Control System (an advanced autopilot)
AFIS - Aerodrome Flight Information Service
AGL - Above Ground Level
AHRS - Attitude-Heading Reference System
 AIS - Aeronautical Information Service. CAA unit based at London-Heathrow Airport, providing flight-planning services and information for pilots
AIZ - Aerodrome Information Zone
AOPA - Aircraft Owners and Pilots Association
A/P - Airport or Autopilot
APP - Approach (control)
APU - Auxiliary Power Unit
ASI - Airspeed Indicator
ASR - Altimeter Setting Region
ATC - Air Traffic Control
ATIS - Automatic Terminal Information Service

B

BRG - Bearing

C

CAA - Civil Aviation Authority – the UK aviation regulatory organisation
CAS - Calibrated Airspeed
CAT - Clear-Air Turbulence
CDI - Course Deviation Indicator
CDU - Control Display Unit
CH - Compass Heading
CHT - Cylinder Head Temperature (a cockpit gauge)
C/L - Centre-Line (of a runway, for example)
Clouds - commonly-used abbreviations for cloud types:-
* AC - altocumulus
* AS - altostratus
* CB - cumulonimbus
* CC - cirrocumulus
* CI - cirrus
* CS - cirrostratus
* CU - cumulus
* NS - nimbo stratus
* SC - stratocumulus
* ST - stratus
CRT - Cathode Ray Tube (television monitor)
CRS - Course
CSU - Constant-Speed Unit
CTA - Control Area
CTR - Control Zone
CVR - Cockpit Voice Recorder
CZ - Control Zone (USA)

D

DF - Direction-Finding
DH - Decision Height
DI - Direction Indicator
DME - Distance-Measuring Equipment

E

EADI - Electronic Attitude Director Indicator
ECU - Environmental Control Unit
EFAS - Electronic Flash Approach Light System
EFIS - Electronic Flight Instrument System
EGT - Exhaust Gas Temperature (a cockpit gauge)
EHSI - Electronic Horizontal Situation Indicator
EICAS - Engine Indicating and Crew Alerting System
ELT - Emergency Locator Transmitter

F

FAA - Federal Aviation Administration, USA equivalent of UK CAA
FADEC - Full-Authority Digital Engine Control
FAF - Final Approach Fix
FDR - Flight Data Recorder more popularly known as the 'black box'
FL - Flight Level
FMS - Flight Management System. Also referred to as FMC (Flight Management Computer)

G

GCA - Ground-Controlled Approach
GNSS - Global Navigation Satellite Systems
GPS - Global Positioning System (Navstar)
GPWS - Ground Proximity Warning System
GS - Glideslope
G/S - Groundspeed

H

HDG - Heading
HF - High-Frequency band
HSI - Horizontal Situation Indicator
HUD - Head-Up Display

I

IAS - Indicated Airspeed
ICAO - International Civil Aviation Organisation (responsible for the codes for airports amongst other things)
IFCS - Integrated Flight Control System
IFR - Instrument Flight Rules
IGS - Instrument Guidance System
IIS - Instrument Landing System
INS - Inertial Navigation System
IR - Instrument Rating
ISA - International Standard Atmosphere
ITT - Inter-Turbine Temperature

K

KHz - Kilohertz
Kt - **Knot** - one nautical mile per hour. One knot equals 1.1515 mph
kW - Kilowatt

L

LARS - Lower Airspace Radar Advisory Service
LAT - Latitude
LDA - Landing Distance Available
LF - Low Frequency - radio waves with frequencies in the 30-300 kHz band
LITAS - Low-Intensity Two-colour Approach System
LOC - Localiser
LON(G) - Longitude

M

M or MAG - Magnetic
Mach - Ratio of true airspeed to the speed of sound. Mach 1 = 1,100 feet per second or 760 mph
MAP - Missed Approach Point
MB - Millibar
MDA - Minimum Descent Altitude
MDH - Minimum Descent Height (above ground level)
MET - Meteorology, weather
METAR - Coded aerodrome MET report
MF - Medium Frequency
MFD - Multi-Function Display

MH - Magnetic Heading
MHz - Megahertz
MLS - Microwave Landing System
MSA - Minimum Safe Altitude
MSL - Mean Sea Level
MTOW - Maximum Take Off Weight
MZFW - Maximum Zero Fuel Weight

N

NATS - National Air Traffic Services
NDB - Non- Directional Beacon
NM - Nautical Mile
NOTAM - Notices to Airmen

O

OAT - Outside Air Temperature
OBS - Omni-Bearing Selector, used to select the radial from a VOR

P

PAPI - Precision Approach Path Indicator
PAR - Precision Approach Radar
PIC - Pilot-In-Command
PIO - Pilot-Induced Oscillation
PLN - Flight-Plan
PMS - Performance Management System
POB - Persons On Board. See also SOB
POH - Pilot's Operating Handbook, an aircraft's 'owner's manual'
Pooley's - Flight guide to the United Kingdom and Ireland, published annually
PPL - Private Pilot's Licence
PTT - Press-To-Transmit

Q

QDM - Magnetic bearing to a direction-finding station
QDR - Magnetic bearing from the station
QFE - Atmospheric pressure at aerodrome elevation
QFU - Magnetic orientation of runway in use
QNE - Reading in feet on an altimeter set to 1013
QNH - Altitude above mean sea level based on local station pressure
QTE - True line of position from a direction-finding station
QUJ - True bearing

R

RAS - Radar Advisory Service
RCL - Runway Centre-Line
RBI - Relative Bearing Indicator, displaying information from the ADF
RDO - Radio
RIS - Radar Information Service
RMI - Radio Magnetic Indicator
RMU - Radio Management Unit
RVR - Runway Visual Range
RWY - Runway
RX - Receiver

S

SAS - Stability Augmentation System
SB - Service Bulletin
SELCAL - Selective Calling
SFC - Specific Fuel Consumption
SID - Standard Instrument Departure
SOB - Souls On Board (see also POB)
SOP - Standard Operating Procedure.
SR - Sunrise
SRZ - Special Rules Zone
SRA - Surveillance Radar Approach
SRE - Surveillance Radar Element of a GCA
SS - Sunset

SSB - Single Sideband
SSR - Secondary Surveillance Radar
STAR - Standard Terminal Arrival Route, for inbound IFR traffic
STOL - Short Take-Off and Landing

T

TACAN - Tactical Air Navigation System
TAF - Terminal Area Forecast
TAS - True Air Speed
TCA - Terminal Control Area (USA)
TCAS - Traffic Alert and Collision Avoidance System
THR or Thld. - Threshold
TMA - Terminal Control Area (UK)
TO - Take- Off (sometimes TKOF)
TODA - Take- Off Distance Available
TODR - Take- Off Distance Required
TORA - Take- Off Run Available
TSO - Technical Standard Order
TVOR - Terminal VOR
TWR - Tower (aerodrome control tower)
TWY - Taxiway
TX - Transmitter

U

UDF - UHF Direction Finding
UHF - Ultra-High Frequency
UIR - Upper Information Region
UTC - Co-ordinated Universal Time, (Greenwich Mean Time)

V

VAL - Visual Approach and Landing (chart)
VAR - Variation (magnetic)
VASIS - Visual Approach Slope Indicator System
VDF - Very-High Frequency Direction-Finding
VFR - Visual Flight Rules
VHF - Very H igh Frequency
VIS - Visibility
VLF - Very Low Frequency
VOLMET - Continuous recorded broadcasts of weather conditions
VOR - Very high frequency Omni-directional Range
VP - Variable-Pitch (propeller)
VRP - Visual Reporting Point
VSI - Vertical Speed Indicator

W

WP - Waypoint
WX NIL - No significant weather, term used in Met reports

X

XMSN - Transmission
XPDR - Transponder

Z

ZFW - Zero-Fuel Weight - maximum permissible weight of an aircraft
ZULU or Z - Used worldwide for times of flight operations (same as UTC)

Airbus 2000
Special Edition



INCLUDES BOTH
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